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MARCH 1960

# Current Anthropology

A WORLD JOURNAL OF THE SCIENCES OF MAN

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Indiana University

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## CURRENT ANTHROPOLOGY

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CURRENT ANTHROPOLOGY is a co-operating group of scholars who interchange knowledge and ideas by means of this journal. These scholars are called "Associates in CURRENT ANTHROPOLOGY" and have the obligation to foster the full and free world-wide interchange of knowledge in the sciences of man centering around physical anthropology, prehistory, archaeology, linguistics, folklore, ethnology, and social anthropology. Associates by supplying information and ideas to all others are therefore assured also of receiving what they need to pursue their own special interests. The concept of an "Associate" is extended also to institutions in the central fields which provide information through CURRENT ANTHROPOLOGY.

The journal CURRENT ANTHROPOLOGY, though initially the means of intercommunication among Associates, is a public document making it possible for interested scholars in other fields, for students, and for others, to know what is going on in the sciences of man. Therefore, subscriptions are accepted from anybody. Associates receive the journal for a smaller fee because their participation means additional expenses for postage and other services. Students in the central disciplines, or scholars in closely related fields, who therefore need to read CURRENT ANTHROPOLOGY, may be recommended by Associates to subscribe at a special rate.

The value to all the sciences of man of facilities for such world-wide scholarly interchange has been recognized by the Wenner-Gren Foundation since its founding in 1941. The International

Symposium of 1952 (resulting in the publication of *Anthropology Today*, *Appraisal of Anthropology Today*, and the *International Directory of Anthropological Institutions*) was followed by the publication of an experimental *Yearbook of Anthropology*, one issue of which appeared in 1955. Part of this was republished in 1956 under the title *Current Anthropology*, which is the origin of the title of this journal. In 1957 the Foundation, seeking means to pursue these ends, established CURRENT ANTHROPOLOGY. Since that time the many possible forms CURRENT ANTHROPOLOGY might take have been discussed in conference and by correspondence with scholars all over the world.

In August, 1958, the conference which inaugurated Burg Wartenstein (in Austria) as a European conference center of the Wenner-Gren Foundation was devoted to this subject. It laid down these broad principles of CURRENT ANTHROPOLOGY:

1. It should be as broad and open as the problems of the changing sciences of man require, bringing together the widest variety of relevant ideas and data, and extending and facilitating intercommunication among students of man wherever in the world they are working.

2. It should be unitary, a single set of cross-cutting materials available to all. All students of the sciences of man should be speaking to one another on the same pages in the same language. Though no scholar can be equally interested in all things, CURRENT ANTHROPOLOGY should not prejudice where the individual's interests will carry him.

3. It should provide communication that is both fast and convenient, a single, common center where scholars can with a minimum of duplication of effort share knowledge of their current activities.

These principles, during the following year, were accepted with enthusiasm at meetings in all parts of the world, and were developed into the present plan with the help of at least 1,000 colleagues. CURRENT ANTHROPOLOGY is a bimonthly journal in English of, by, and for the scholars of the world who pursue the anthropological sciences including physical anthropology, ethnology, folklore, linguistics, social anthropology, prehistory, and all their sub- and related sciences by whatever names.

CURRENT ANTHROPOLOGY publishes two classes of materials, "Review" articles and "News and Reference" materials.

A Review Article is a major review of current knowledge (and its bibliography) in any relevant subject matter, or of the literature in some broad area of current interest. It is a guide by a

specialist of the subject addressed to specialists in other fields. It should therefore treat a subject of interest to a broad segment of anthropologists usually comprising several of the subdisciplines, and for those of different scholarly traditions; and which are either new considerations of traditional subjects or preferably subjects of new and growing interest. New material at the growing points of anthropology and new evaluations are preferred to syntheses of what has become well known, but the new should be placed in the context of the known. Therefore, also, no matter how technical the subject, an article should explain itself and be written in language that will be followed by scholars in other specialties.

Each CURRENT ANTHROPOLOGY Review Article will be handled according to what we call "CA★ treatment" and thus will be the nucleus for intercommunication among specialists in the area covered by that paper. After a paper has been read and provisionally accepted, it will be duplicated and sent to a list of readers. This list will include names suggested by the author and will have two general categories of people: (1) readers who are also experts in the topic under consideration, and (2) readers whose interests are at the edge of the material; people who treat it either as part of a larger whole, or as the whole of which they are primarily concerned with the parts. In both cases the readers may add material, argue the interpretation, or say nothing. In every case: (a) readers' comments will be sent to the author for consideration and action; (b) the Editor will review this use of the comments, and (c) consult with the readers and author if he sees any problems. This plan seems to be a promising way to facilitate intercommunication. By sending each paper to a variety of people, we shall have a different level of accuracy and comprehensiveness, and a greater opportunity to answer the questions which arise at the edges of our field.

"News" is necessarily limited to items of importance and general interest; but items of importance to fewer Associates may be published in brief form where appropriate.

"Reference" materials include systematic guides to materials of general interest—a bibliography of published bibliographies, guides to guides of research collections, etc., directories of scientists and scientific institutions in all of our fields; lists of Ph.D. dissertations and research in progress; and whatever other standard information seems most useful to facilitate the work of all.

CURRENT ANTHROPOLOGY will eventually

Continued on inside back cover





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# Our Readers Write

The general plan seems excellent, though depending on an Editor *sans peur et sans reproche*.

ETHEL JOHN LINDGREN

(1) You mention that "articles should be written in general terms for the professional audience. . . ." Don't you think that this will lower the standard and the value of the publication? Surely the article should be as "technical" as desired and a good summary should be sufficient for "the professional audience in the various disciplines." This will maintain the value of the publication at research level and not just at "Reader's Digest" level. (2) May I suggest that "CA Editorial Committees" be established in major areas, e.g., in Africa for Southern (including East), Central (Congo), and Northern, to act as advisory bodies and "secondary" mechanisms. Possibly each "Local Chairman" of such committees could write annual reports on research and interest in each area, and his material would be fed to him by his committee and the members in the area receiving CA. Such committees could also be utilized to sponsor symposia or nominate representatives to Congresses or Supper Conferences, etc., and in this way CA would mobilize and unite anthropologists in each area. Such committees should not, I believe, consist of more than five members. RONALD SINGER

Highly specialized subjects should not be underestimated.

CARMEN COOK DE LEONARD

Major reviews of subjects of too great scope I might mind being asked to write articles on.

REO FORTUNE

The prospect of an international and interdisciplinary serial publication is a most welcome one. It seems to me that CURRENT ANTHROPOLOGY could be of the greatest service to our discipline and to others if it were to present summaries of theoretical advances in the various specialties within the subdisciplines of anthropology. I think that reports of individual research projects, as well as summaries of work in the various ethnographic areas, might well be left to symposia, textbooks, and to some of

the anthropological series which are already specializing to some extent in the material they present.

GERTRUDE DOLE

Hope we stick to the summarizing, significant *important* article, a la *SWJA*, avoiding things like . . . field notes verbatim.

WESTON LA BARRE

Microcards and readers, definitely!

GENE WELTFISH

In view of the demands upon publication space, it would seem desirable to me that shorter, more concise articles be requested. I think the demands upon our reading time might be more readily met by reducing the verbiage of our articles.

WILLIAM G. HAAG

It should be an important new outlet for articles of a kind and a length that are sometimes hard to get published and circulated properly.

NEIL C. TAPPEN

I just cannot agree . . . that reporting in a typescript "combines the advantages of symposia. . . ." Communication with people . . . is very different from looking at papers!

J. G. D. CLARK

Very happy indeed to see this—I am one who thinks we need more such journals as human communication and interaction increases over the world. I hope that CURRENT ANTHROPOLOGY can include among its interests the matter of anthropology below the college level. I think there are signs that it will appear increasingly in the curricula of high schools—one such course was instituted this year in San Diego—and I am not sure that the instructional approach followed on the college level can be transferred.

PAUL EZELL

For people largely concerned with undergraduates, reviews of major blocks of knowledge are of great importance. We teach all fields of anthropology, not just our specialty. Keeping up with significant theoretical developments is difficult in certain fields where one does not try to do research. An anthropologically oriented, annotated film bibliography would be

most useful. Some school with an active audio-visual department might collaborate with an anthropologist on this.

GEORGE H. FATHAUER

Arouse the physical anthropologists to importance of what Roger Williams calls "Chemical Anthropology." Other suggestions: Less academic and theoretical discussion (save as facts point to new theoretical interpretations) and a revival of emphasis on protracted field research that eventuates in insight (i.e., too many current researches in the field are hasty, superficial, based on mechanical application of "research techniques" rather than intimate knowledge of a people). Ethnography, like history, cannot become complete and the people that have been "thoroughly studied" go on changing after they have been studied. Hence need of more dependable data in every ethnographic situation. . . . Less group research and committee deliberation; more ethnographers who really know the people they study. . . . It is time for ethnographers to produce histories. . . .

DOUGLAS G. HARING

One of the pressing needs in cultural-social anthropology is a statement of research methodology, not limited to techniques, on the one hand, or how to make friends and avoid making enemies on the other, but an analysis of the research process as conceived by the anthropologist, which at the very least should raise some of the fundamental problems regarding the status of cultural-social anthropology as a science. 2. An analysis of the kinds of explicit and implicit theoretical assumptions that characterize the current writings of cultural anthropologists: what this tells us about cultural anthropology in relation to the foreseeable avenues of development for cultural anthropology. 3. An evaluation of the kinds of generalizations that cultural anthropology has produced, how they have been derived, and the validity that can be imputed to them. 4. Symposium articles that will take topics common to research in several fields or related topics of research in several fields and summarize current research perspectives and the kinds of results being obtained, e.g. organization behavior.

WILLIAM J. McEWEN

Let me make a plea here for some attention to inter-disciplinary research.

INEZ ADAMS

I hope that in CURRENT ANTHROPOLOGY there appear not only articles on anthropology but also on other complementary matters. GUILLERMO BONFIL

Perhaps more contact might be had through our journal with people from such fields as economics and political science. Would be at least interesting to know more about what they think-teach of anthropology.

ORVOELL ROGER GALLAGHER

This publication should be of value not only in meeting the need for better means of world-wide communications but also to emphasize the essential unity of all the sciences. Might not a section be added to include comments, reviews, etc., from the other fields as they affect anthropology? Can we not also interest business and political leaders in this journal? RUSSELL E. BELOUS.

This is an excellent opportunity to emphasize cross-cultural phenomena both in content and scope. Would like to see through this a closer rapport of professional to lay personnel.

ROBERT ARISS

I would urge the editors to provide space for all persons interested in the science of man and his customs. I find other professional societies are or have closed their ranks and journals to those not privy to the rites of the tribe. . . . The heritage of our discipline is the study of man and his customary behavior. So long as a person acknowledges the primacy of the rationality of science and seeks to use the empirical method of factual validation, he should be given space and attention. Anthropology will lose a custom vital to its continued development if it bans the missionary and amateur . . . [whom we need to] remind us that Darwin might find it difficult to secure publishing space today as an amateur!! A review such as CA is greatly needed, as is an up-to-date professional directory with the above data.

THOMAS RHYS WILLIAMS

- (1) Publication of *trend reports*, together with a classified and annotated bibliography, making the point on studies relative to a particular theme.
- (2) Re-examination of aims and means of anthropology in a world submitted to rapid changes.
- (3) Research and contributions considering the role of anthropology in inter-disciplinary projects.
- (4) Initiative of conferences related to methodological matters.

GEORGES BALANDIER

I suggest special volumes for different thematas. . . .

BENGT LINDEGARD

That papers read at meetings . . . and published *much later*, or not published, be sent in mimeographed form or otherwise to members of CA who cannot attend and who have asked for them.

SANTIAGO T. GENOVES

Regarding format, I should like to see footnotes used (permitting another rhetorical level besides parentheses) and italics for non-English terms throughout, not only the first time (because the same letters may constitute an English word by sheer coincidence). . . .

WILLIAM H. SCOTT

I would like to suggest that a slightly heavier stock be used for the cover of the journal. This suggestion is made only if it would not appreciably increase the publishing and mailing cost, or considerably alter the pagination of successive issues of the journal. Several individuals looked through my copy of the Pre-Issue and noticed the corners and edges of the cover had a tendency to curl. I am sure there are many individuals like myself who do not have the annual issues of their scientific journals bound in hard covers and we appreciate journal covers which can stand up under repeated handling and also stand upright in a bookcase.

I am sure that individual issues of CA will be extremely useful as a reference source and will receive repeated usage. It is therefore desirable, I feel, that the individual issues be covered with a slightly heavier stock paper.

JACK R. RUDY

CURRENT ANTHROPOLOGY ought to be bilingual, most scholars in Europe and the Near East writing preferably in French.

STIG WIKANDER

While I understand the striving to have information reported in one language, for which of course English is the most suitable, I am afraid that the sole use of this language will encourage young people not to get a reading knowledge of at least French, German, and either Spanish or Italian. . . . I have given and will give my lectures and seminars in English, but always demand reading knowledge in at least French and German.

HANS HENNING VON DER OSTEN

. . . as I understand it, the major aim of CURRENT ANTHROPOLOGY would be "the updating and completion of the 1953 Wenner-Gren Foundation book, *Anthropology Today*," and this is precisely what the COWA surveys and bibliographies are doing insofar as the general field of Old World archaeology is concerned.

HALLAM L. MOVIUS, JR.

I am heartily in favor of a synoptic review such as is proposed for CURRENT ANTHROPOLOGY. I am wondering if it is necessary that a separate publication be formed. Cannot this kind of thing be handled by existing machinery, i.e., the AA? Special issues or memoirs or even

subsidized articles in the regular issues would seem to reach a wider distribution and be more efficient from point of view of editing and printing them in a new series. Has an anthropological publication ever tried the use of *interlingua* at least for abstracts?

DOUGLAS OSBORNE

Have you considered utilizing the facilities of various local anthropological societies? In the U.S., for example, many state archaeological societies, as well as anthropological organizations . . . , comprise pools of "talent" which might be exploited.

VIRGINIA WATSON

Though I appreciate the danger of too rigidly defining the scope of the journal, I see a need for editorial or research-review boards in the traditional fields of anthropology. The function of these boards might be (1) to solicit articles which might not be forthcoming otherwise, and (2) to organize meetings of scholars on emerging areas of research in their field of specialization. Articles . . . might result from these meetings.

DAVID AMES

## Review Articles

Much misinformation has been published in the literature regarding the Blood Groups. For the latest information see our book on Heredity of the Blood Group—just published by Grune and Stratton—I hope your journal will help correct some of the misconceptions regarding the subject. It could help by more careful editing of articles published in the field. I am willing to help.

ALEXANDER S. WIENER

I suggest (a) an article comparing Old World and New World taxonomic practices and their effectiveness, by Rouse—in effect, bringing things up to date and assessing results; (b) a general article on the dynamic interrelationships between anthropology and the rest of our culture—specifically, how historical developments in the past 25 years or so have affected developments in anthropology, and what may be in store for the future (logical author—Kluckhohn); "Anthropology as part of the general culture" could be a continuing subject in CURRENT ANTHROPOLOGY. . . .

E. MOTT DAVIS

I would like to add studies in comparative urbanization to your list for archaeology; also papers on functional interpretation of archaeological data. A critical examination of the concept of "settlement patterns" and an appraisal of the value of this approach.

WILLIAM J. MAYER-OAKES



Trends in study of prehistoric social systems (history of efforts to study).

WILLIAM SEARS

... topics to consider: Archaeological Contributions to Culture Change (Ford). . . . An article on the changes and development of the culture area concept as it is now being used both in archaeology and ethnology.

How about some general articles on newly developing fields such as Ethnomusicology (David McAllester).

Of interest to the younger students might be an article, possibly growing out of a series of short individual contributions, on the archaeological problems to be solved or time and space units to be filled in each major archaeological area.

DOUGLAS SCHWARTZ

Glottochronology. Craniology.

DONALD S. MARSHALL

Prehistoric ore mining as a special science. Use and value of spectroanalysis in prehistoric archaeology.

RICHARD PITTIONI

... articles concerning ancient metals  
....

HERBERT H. COGHILAN

The present position and future prospects of prehistoric research in Africa south of the Sahara.

J. DESMOND CLARK

Iron Age of Northern Rhodesia. Stone Age of Northern Rhodesia. Anything on Palaeolithic and Mesolithic of Europe and Africa.

BRIAN M. FAGAN

History of writing, epigraphy, Near Eastern Archaeology.

DAVID DIRINGER

Italian prehistory.

OTTAVIO CORNAGGIA MEDICI CASTIGLIONI

Cultural or economic problems of the Bronze and Iron Ages in Central Europe (mainly Carpathian Basin). Cultural correlations between Central Europe and Greece (and Italy). Hungary.

STEPHEN FOLTINY

... a survey of the current state of research relating to the (1) ethnic minorities of the U.S.S.R., and (2) folk cultures of Eastern Europe. . . . I would gladly assist another Associate insofar as my special interests—the Uralic peoples and languages—are concerned.

THOMAS A. SEBEOK

Articles on European prehistory, on Siberian and Australian ethnology. In Mexico: on the East Coast cultures (Totonacs, Olmecs . . .).

WALTRAUD HANGERT

Origin and early history of the farm animals in Central Europe.

JOACHIM BOESSNECK

The archeology of the Scottish Highlands, which covers the time span from Mesolithic times down through one Iron Age.

PAUL R. DUCEY

Archaeology in the Far East since World War II.

WILHELM G. SOLHEIM, II

Although I have indicated willingness to write articles, the field of prehistoric settlement of southeast China and in particular the region of Hong Kong is such a very restricted field, that I would question its feasibility. Is there any hope of a composite report of various small fields in this area in the Pacific?

MARY TREGGAR

Pleistocene Geology, Environmental Archaeology, Technology (Primitive), Prehistoric Archaeology, American Origins (Cultural), Archaeological Methods and Techniques.

JOSÉ LUIS LORENZO

American archaeology (Colombia).

JOSÉ PÉREZ DE BARRADAS

The next steps in the study of the structure and culture of the Inca state.

JOHN V. MURRA

Right now ceramic studies in Mesoamerica are in a ferment. I suggest a review article on the history of the concepts and theories of ceramic study organization, and present problems. It should be of importance to all fields of archaeology. I suggest Willey, Phillips, Gifford, and R. E. Smith.

KEITH A. DIXON

Problems Relating to the Formative Development of Nuclear America, or The History of the Spinden Hypothesis in New World Archaeology.

MICHAEL D. COE

(a) Archaeology and Ethnology of Central America and Mexico; (b) Museums in the U.S.A. and Europe and Latin America.

STEPHAN F. DE BORHEGYI

Recent Advances in Plains Prehistory.

ROSCOE WILMETH

Prehistory in the Northwestern Plains. The Fremont Culture in Southwestern Prehistory.

DEE C. TAYLOR

I would be glad to write on human ecology of Plains and Prairie groups either singly or with others interested in this area.

JAMES H. HOWARD

Problems and present status of Early Man research in the New World, with special reference to North America. Research trends in the archaeology of the Middle Atlantic Slope.

RONALD J. MASON

Material on Central U.S. archeology.

ROBERT L. STEPHENSON

Historic Site Archeology in the U.S. (The importance of archeology as a contribution to historical interpretation is just becoming apparent. It is just as important to discover the reality of acculturation as it influenced the waves of European immigration to North America as it is to figure out the character of acculturation in Indian communities. *Possibly even more so.* Heresy, isn't it?)

JOHN L. COTTER

Current assessment of cultural evolution on a world-wide scale by levels of food-getting efficiency—industrialization. An article or series of articles on comparative institutions in prehistory—technology. Stability and continuity in culture. Technology. The relation of technology to the rest of culture.

ROBERT F. G. SPIER

Perhaps "The problem of the origin of high cultures."

HORST NACHTIGALL

Mexican and South American Ethnohistory.

BARBRO DAHLGREN-JORDÁN

Two areas of research have been lagging to some degree. One is a complete review of horticulture in the New World and the other is Spanish-Indian contact in regard to material culture, especially ceramics. . . . Still another area in somewhat the same vein is the Spanish-American village culture of New Mexico and other parts of the Southwest. I fully realize work has been accomplished in the above problems, but it has been rather piecemeal.

HERBERT W. DICK

(a) On ethnological cartography (ethnological atlases) in Europe; (b) on ploughing implements, especially on international research concerning this subject in the whole world.

BRANIMIR BRATANIĆ

Ethnology and tribal history of British Central Africa, and especially material culture of the area.

BARRIE G. R. REYNOLDS

Articles, etc., concerning African ethnology and religion, and folk-lore.

OLOF PETTERSSON

... articles on such subjects as: (a) Culture Areas of Africa, (b) African Culti-

vated Plants, (c) Typology of Affinal Kinship Terminology.

GEORGE P. MURDOCK

... Murdock's ideas are new, startling, untraditional, and significant enough to require perhaps the special attention and comment of Africanists all over the world. Could "An Assessment of Murdock's *Africa*" be organized, with a handful of experts commenting on and criticizing his thesis of independent origins of Negro agriculture? Or, if preferred, then a symposium on "The Problem of Negro Agriculture"?

Why not commission a broad survey article, probably by a qualified Britisher, on the problem of Egypt-Sudan-West Africa diffusions and cultural influences?

Why not ask Alfred G. Smith to write a review article on the ethnopsychiatry of Malaysia (latah, amok)? He reads both Dutch and Malayan and has enormous bibliographic command of the subject.

Why doesn't Jim Spuhler do a summarizing article, primarily for cultural anthropologists, showing the relationships of human biology and human culture, or *summing up recent studies* in this general area?

WESTON LA BARRE

Ethnology: Ethiopia and, especially, Dankalia.

GEORGE C. SAVARD

I might provide results of ethnological field-work researches in Upper Volta, West Africa. Studies on the history of Primitive Art. Studies on the historical development of African kingships, etc.

KUNZ DITTMER

... article on Negro painting, Negro sculpture in mud, Negro architecture. Manuscript on "Negro Mural Painting in French West Africa" (richly illustrated) in author's possession.

HERTA HASELBERGER-BLAHA

Papers, etc., about Central African arts.

HERMAN BURSSSENS

Ethnology and Anthropology of the Pacific Area. Religion of Nonliterate People. Method of Historic Reconstruction among Nonliterate People.

CARL-AUGUST SCHMITZ

Ethnology of Polynesia. Ethnology of Northeastern North American Indians. Primitive Art. Maritime Aspects of Ethnology (General).

ERNEST S. DODGE

Book on Kuanyama Ambo Bantu is about ready for press. ... I could ... extract material on "Primitive Feudalism". ...

EDWIN M. LOEB

I might provide a review of develop-

ments in the ethnology of the Caribbean area.

SIDNEY W. MINTZ

New light on art and mythology in the Caribbean.

EUGENIO FERNÁNDEZ-MÉNDEZ

Ancient Near East. Mythology of the Ancient World. Comparative Mythology.

SAMUEL N. KRAMER

(1) Ethnological Research on the Middle East: Status and Prospects; (2) Orientalists and Anthropologists: A Consideration of the Concept of "Islamic Culture."

WILLIAM D. SCHORGER

Would like to see Richard Coughlin (Yale) and Cora DuBois (Radcliffe) collaborate on Peoples and Cultures of Southeast Asia. I'd be glad to help out.

WILLIAM L. THOMAS, JR.

I have a manuscript ready now, "More Songs and Stories of the Ch'uan Miao," which describes their customs extensively and gives 270 songs and stories. Dr. Wolfram Eberhart has collaborated in this work.

DAVID C. GRAHAM

Bisayan Folklore of Central Philippines (Visayan Islands). ... Also Bisayan Folk Medicines, their methods, and applications. ...

TIMOTEO S. ORACION

Recent trends in the study of New Guinea cultures (in collaboration with others).

A. C. VAN DER LEEDEN

I am now writing on "the culture complex in Japan" as a Seminar Arbeit in Vienna University. ...

SUMIYA KAZUHIKO

Occasionally, review of Japanese reactions to articles or books on Japan written by non-Japanese. Materials on Ryukyu Islands. General articles on Japanese society. Some basic comments on the integration of cultural and biological phenomena.

DOUGLAS G. HARING

I would be interested in writing about integration of historical and ethnological materials.

PEDRO CARRASCO

In the area of ethnogenesis.

WOJCIECH KÓČKA

I might write: "The Determinants of Social Organization: A Survey of Contending Theories." Article you might ask others to write: Leslie A. White: "The Revival of Cultural Evolution: Its Causes and Results."

ROBERT CARNEIRO

Brazilian Studies. Cultural Evolution—Ecological Processes.

ANTHONY LEEDS

... ultimately be interested in doing a piece covering and interrelating the various systems of analysis of regularities in cultural development (Redfield, Murdock, White, Stewart).

HORACE M. MINER

... would like to contribute to chapter or article on *posture and related motor habits*. On *culture area concept reconsidered*, would like to participate, e.g., with Elizabeth Bacon, Raoul Naroll, G. P. Murdock, Richard N. Adams, *et al.* On *fishing and fisheries*, would like to review or comment. ... *Peoples of the World*: Especially interested in this, which I think perfectly feasible in view of existing German, Italian, and especially recent Soviet world ethnographic syntheses. Would be very interested in participating in organization of this project. ...

GORDON W. HEWES

I should be interested in doing article: Philosophies of Culture History. Another topic of interest: Cultural Universals and the Idea of Progress.

DAVID BIDNEY

I would be willing to write a review article on theory and techniques in the study of culture structure (pattern, configuration, theme, etc.).

E. PENDLETON BANKS

I would consider the following topics: The unit of study—problems of definition and the effect of the unit on the theoretical framework that is used; the use of culture as a master concept vs. the use of social structure; stability and continuity in culture; model building; role theory and its relation to anthropology. For the *Peoples of the World* section, something like "Kinship Systems of Mexico."

A. KIMBALL ROMNEY

... write or comment concerning (a) the structural definition of cultures as bounded systems (entities capable of discontinuous subdivisibility) (especially national cultures as unit-systems); (b) transitional cultures: cultures types characterised by a stable structured relationship between "civilisations" and marginal (not primitive) (politically independent?) kinship societies.

F. K. LEHMAN

(a) "Human Universals" as Limits of Variance in Cultures, an evaluation of limits to the range of human behavior; (b) Differential Rates of Change in Behavior Patterns, an inventory of suggestions concerning differential rates of cultural change.

DWIGHT B. HEATH

I would be willing to write an article

on any of the following: Different approaches to the study of social structure: Parsons-Weber, Radcliffe-Brown, and Murdock; The use of culture as a master concept vs. the use of social structure; The comparative method: illustrative approaches, concomitant variations and the cross-cultural survey; model building; social organization and social structure including kinship and political systems and social stratification.

EDWARD H. WINTER

I would like to see a Review Article on the present status, progress and future problems in research on bilateral social systems.

WILLIS E. SIBLEY

A cross-cultural study of bilateral kin systems in the Indonesia and Southeast Asia areas would be an interesting article if done co-operatively by researchers in each country of the area.

FRANCIS C. MADIGAN, S.J.

It seems to me that African data now available ought to be compared and organized on general theme of fissioning lineage systems. Also witchcraft and social control, and both of these in comparative perspective with politically organized as against essentially atomistic systems.

MAY EDEL

I am planning to write an article on the Acadian kinship system (of Nova Scotia). . . . I would like to write 2-3 articles (or a monograph) on the process of acculturation among the Acadians of Nova Scotia. . . .

MARC-ADÉLARD TREMBLAY

I propose an article on the state of knowledge of "matrilinal," "matri-potestal," etc., institutions and their effect on the social psychology (shift from patrilineal to matrilocal and -lineal complex, etc.). I do not know if I have enough time available myself, but I have materials.

HANS DIETSCHY

. . . interested in an article on withdrawal as a means of dealing with supernatural.

RUTH M. UNDERHILL

Theories of Primitive Religion.

EVON Z. VOGT

A subject worthy of exploration is the extent and the degree of toleration of unorthodox philosophical and religious views prevailing in societies having an organized priesthood upholding popular dogmas and an official theology. An especially brilliant study of this kind is *La Filosofía Nahuatl*, by Miguel Leon-Portilla. . . .

My thought on chiropractic as a problem (or series of problems) in applied anthropology involves: (1) comparative

anatomy of the mammalian spine, static and dynamic problems peculiar to the upright posture, incidence and racial distribution of lower back anomalies and their clinical significance; (2) the spread of chiropractic as a problem in acculturation; (3) the conflict between chiropractic and as material for the study of intergroup tension and its sociological significance. The contrasting attitudes of German and American physicians and the reasons therefor.

CLARENCE W. WEIANT

I would like to see an evaluation of the studies of religion, particularly of cosmology and symbol systems generally, by French scholars such as Griaule, Paulme, Dieterlin, etc.

Under the category of interdisciplinary approaches, I am interested particularly in problems of perception and cognition; the use of semantic analysis as an approach to this problem; reference group theory.

Under socio-cultural change, I think it might be worthwhile to synthesize recent publications (both journals and monographs) in applied anthropology, with a view to determining whether there may not be implications for a systematic theory of change.

I realize that the topic of the village as a unit of study has been dealt with before, but I would like to see a broad-scale assessment in terms of theory which would incorporate a wider range of data. For example, we now have a number of intensive studies of African villages. I would like to see this material brought together with materials developed upon a similar unit basis from other regions of the world. It seems to me that there is a possibility of a different emphasis in social structure developing in these studies.

The topic "non-kinship groupings—comparative analysis" should include an assessment of Eisenstadt's recent work; in addition, further explorations in the area would be desirable. I have been concerned with this problem off and on. . . .

HARRY W. BASEHART

Local anthropological studies of "complex societies." SAMUEL N. EISENSTADT

I would like to see C. Arensberg write an article on the community (e.g., a comparative study of community as an organization). ISHINO IWAO

Study of cultural frontiers, e.g., Fiji. Study of fishing communities. The background of kin avoidance.

KARL E. LARSSON

Current status of theories on peasant culture (with Stephen C. Cappannari).

LEONARD W. MOSS

The current state of inquiry in respect to non-Western political systems. (A graduate training program for research workers in this area has begun this year. . . . Staff and fellows in the program could—will, in any event—prepare such an overview, which will be definitive . . .).

FRED GEARING

I would be interested in writing on South American culture and social structure, with special reference to role of alcohol.

OZZIE G. SIMMONS

Articles pertaining to culture and nutrition or diet, and the impact of this aspect of culture upon society at any given time.

H. LEON ABRAMS, JR.

World Food Habits. Energy Utilization by Man and Human Society.

RICHARD N. ADAMS

Researches on the Early History of Property. Intertribal Relations in South Africa.

RÜDIGER SCHOTT

The Nature of the Traditional African State. The Problem of Labor Migration in Africa. The Present Functioning of Traditional African Political Systems. Religion in Modern Africa.

ELLIOTT P. SKINNER

Transformation of relatively primitive into more advanced labor force.

JOSEPH J. SPENGLER

Utilization of prehistoric data as a foundation for the study of material culture and its function in modern societies.

JAMES B. SHAEFFER

The Role of Medical Science and Practice in Acculturation Processes.

WOLFGANG SCHOENE

I hope some space in the Journal will be devoted to acculturation studies especially in regard to research methods and concepts recently developed. . . .

MOISES C. BELLO

Research articles on culture change in the Philippines submitted to the Community Development Research Council, University of the Philippines.

HARRY L. NAYLOR

On social anthropological research and problems especially in Aboriginal Australia and Central Highlands of New Guinea (traditional life, as well as relating to social and cultural change). In a general way, . . . there is the problem of anthropological research in Western European-type society, i.e., a review of this field in terms of both past developments and the present position, including some reference to relations with Sociology.

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EDMUND CARPENTER

### Reference Materials

I feel that a listing of the [world's] anthropological museums needs to be up-dated, and I gladly volunteer to do this job for the Central American museums.

STEPHAN F. DE BORHEGYI

An index of museums in the United States and Latin America having material on American archaeology.

JOSÉ ALCINA

Notes on the Museum Rietberg (extra-European art) of Zurich.

ELSY LEUZINGER

. . . [I am] willing to undertake anything within reason. [I am] especially interested in [the] history of [the] development of archaeology throughout the world. [I have an] accurate knowledge of the collections in the Rhodes-Livingstone Museum, Northern Rhodesia.

BRIAN M. FAGAN

I would like to suggest that the prehistoric collections made by the American Central Asiatic Expedition (1922-30) in Mongolia, and stored in the American Museum of Natural History in New York, be published, at least in form of a catalogue.

JOHANNES MARINGER

The Nuffield Blood Group Centre (Royal Anthropological Institute), to which I am honorary adviser, is constantly collecting factual and bibliographic data on the distribution of all the blood groups and other genetical characters in all human populations. Information drawn from this unique collection will be given to anyone who can use it for scientific purposes.

ARTHUR E. MOURANT

[An] international index of anthropological (and related) periodicals [and materials on the] history of anthropology.

ANTHONY LEEDS

. . . I certainly will offer my survey of anthropological periodicals when it is finished.

GEORGE SZABO

I have started to assemble a reference guide of all the books the Fondo de Cultura Economica . . . has published in the field of anthropology or related sciences.

LAURO JOSÉ ZAVALA

. . . I should also like to propose another way in which CURRENT ANTHROPOLOGY might be of value in helping Associates around the world to be better informed of recent research. If it were at all economically feasible, I should think it would be immensely valuable to have an occasional listing of current bibliography of journal articles on various geographic and/or topical areas. Rather than having the editors or Associates comb the journals, CA might solicit copies of everything published by members, and group them under a crude classification scheme. If this were too ambitious, a saving would be effected by avoiding duplication of those areas which are already covered by a similar system (e.g., *Boletín Bibliográfico de Anthropologia Americana*, *Oceania*, *African Abstracts*, and so forth). Simply filling the gaps in such summary coverage would, to be sure, constitute an immense undertaking, but it would also be extremely helpful in a discipline such as ours where the literature is so broadly scattered, and where anyone would presumably be happy to give wider distribution to reprints among interested Associates who might otherwise never "discover" a paper which is relevant to their interests but not in one of the major professional journals. (I have in mind, for example, the wealth of sound anthropological reporting and analysis which often lies unnoticed in journals which are primarily devoted to regional history, sociology, economics, or biology.)

DWIGHT B. HEATH

. . . I believe it would be desirable for CA to appoint a specialist in each country who would supply a quarterly bibliography of the anthropological publications in order to inform others about the progress of anthropological research in his part of the world.

SERGIO ELIAS ORTIZ

Missionary Reports from Africa [and] materials from "Black Nationalist" groups in the U.S.

ELLIOTT P. SKINNER

Ethnographical material in log-books, e.g., whalers, [and] archive material in missionary societies.

KARL E. LARSSON

Mythological texts not yet published,

existing as manuscripts in several places, particularly from the Pacific Peoples (New Guinea, Melanesia).

CARL A. SCHMITZ

Summary of material on mythology and other oral literature for Aboriginal Australia [and] ditto for New Guinea (excluding Western New Guinea . . .).

CATHERINE H. BERNDT

Manuscript references on history and native cultures in Central America.

SUZANNE W. MILES

Translation into English of interesting anthropological and ethnological topics from the "Jahresberichte der Franziskanermissionen" (regarding Indian tribes of Eastern Bolivia).

ENGELBERT-K. GIERTLER

Annual list of M.A. and Ph.D. theses . . .

NATHALIE F. S. WOODBURY

Lists of dissertations regularly.

HORST NACHTIGALL

Field work in progress [and] grants received. [In each case minimum information should include the] names [of the persons involved, their] institutional and field addresses, [and their research] topics.

Instead of relying solely on responses by individual Associates [for information relating to field work in progress] you might rely principally on heads of institutions . . . (departments, museums, government bureaus, etc.) to send . . . yearly notices of field work by members of their . . . [staffs]. This procedure might, particularly in the first couple of listings, help avoid missing the inclusion of those people who are not likely to respond because they are currently in the field.

Another . . . source, I would think, are the granters of funds themselves, be they foundations, governments, or other agencies. . . . Tapping these two sources ought to permit better routinization of the transmission of this sort of information than would be possible by relying solely on the field workers themselves.

ANDREW GUNDER FRANK

Ethnographic, archaeological and other maps. . .

GORDON W. HEWES

List of films of ethnic dances (genuine, not stage).

GERTRUDE P. KURATH

. . . listings of collections of still films (with occasional selections of interesting examples?) would interest me.

GABRIEL W. LASKER

A survey of African linguistic studies in Germany, a history of the Seminar für



Afrikanische Sprachen und Kulturen at Hamburg University. . . .

HERRMANN JUNGRAITHMAYR

The development of anthropology in Portugal. ALBERTO XAVIER DA CUNHA

History of the development of anthropology in Ethiopia. GEORGE C. SAVARD

In the archives which I have assembled over the past ten years are materials for compilations of this type covering most of the aspects of the anthropology of Polynesia. DONALD S. MARSHALL

Ethnology of Australia, ethnology of New Guinea, anthropology of law, [and] political structure. LEOPOLD J. POSPISIL

On aboriginal Australia—specific problems. Social and cultural change: indigenous religion, etc. RONALD M. BERNDT

Peoples and cultures of Southeast Asia. TIMOTEO S. ORACION

Cradles for infants in Japan. MURAKAMI TAIJI

U.S.S.R. ethnology [and] . . . ethnography. LAWRENCE KRADER

. . . Northwest Mexico, especially Seri Indians. WOLFGANG H. LINDIG

Meso-American and Northern Mexican origin myths. BARBERO DAHLGREN-JORDÁN

Neolithic square-mouth vessels in the Balkans area. OTTAVIO CORNAGGIA MEDICI CASTIGLIONI

. . . ethnology (social anthropology) and folklore of South Eastern Europe. MILOVAN GAVAZZI

Slit-gongs, especially African. FERDINAND J. DE HEN

On earliest tools and [other] artifacts in Africa (Pebble-tools, "Kafuan, Old-owan," etc.) GÜNTER SMOLLA

Domestication and early history of domestic animals. JOACHIM BOESSNECK

Archaeology of the valley of the rivers Vecht, IJssel and Maas (Overijssel and Gelderland provinces), Holland. JAN BUTTER

Social evolution of Primates including man, ecology and comparative sociology of [the] Japanese monkey, [and the] ecology and comparative sociology of Primates in Colombia, South America. TOKUDA KISABURO

On functional anatomy.

MELVIN L. MOSS

Data pertaining to culture and nutrition and diet. H. LEON ABRAMS, JR.

Social classes: independent origin and acculturation. ARTURO MONZÓN ESTRADA

Anything on social and cultural change. BERNARD J. SIEGEL

Surnames of all lands, sib names of all tribes and bands, personal names of all lands, place names of all lands, [and] ethnic nomenclature of all peoples. WILLIAM H. GILBERT

### Specialized Bibliographies

. . . in principle, considerations of space and generality of interest might well preclude anything more detailed than bibliographies of bibliographies. . . . If there should be sufficient interest, however, I would be happy to offer [two] fairly comprehensive bibliographies. . . .

Anthropological research in lowland Bolivia: extremely comprehensive coverage of the diverse and scattered literature, which is small in total. Archaeology, ethnography, and sources for ethnohistory. Includes Bolivian imprints which are lacking in *Handbook of South American Indians*. Up to date. Approximately 250 entries.

Studies on alcohol in social and cultural context: virtually exhaustive coverage of descriptive, analytic, or comparative discussions of drinking behavior as a socio-cultural phenomenon. Drinking patterns of various societies, social classes, castes, religious sects, occupational and other socially meaningful groups around the world. Up to date. Approximately 200 entries.

The quality and quantity of annotations and abstracts for each entry reflect my own various interests, and it would require considerable time and effort to prepare fairly uniform treatment if anything beyond sheer listing were required.

It may be that such specialized bibliographies can best be shared by means of personal exchange between interested scholars who could contact each other through the "Notes and Queries" section of CA, rather than in the pages of the journal itself. I shall be interested in following developments, in whatever direction they may go, for CA represents to me an exciting new means of communication in a field which has suffered too long from not recognizing the need of new channels. It was all good and well when we were a select fraternity where everybody knew what everybody else was doing, but the enormous growth of the profession during just this decade has precipitated the

need for services such as CA is to perform—even within the U.S.A., quite apart from the other important areas of the world. DWIGHT B. HEATH

[I have] a bibliography of geochronological studies bearing on the antiquity of man in the New World under way . . . .

As I envision it, such a bibliography would be prefaced by some remarks as to the history, present status, and probable future trends of the geochronological approach to the problem of Early Man in the New World. . . .

If you decide to publish such a bibliography I would suggest a two-fold breakdown into North America and South and Middle America (including Mexico). Publishing the bibliography in two articles or sections would avoid lists whose usability might be hampered by sheer length since most scholars working on these problems are interested primarily in North America or in South America. North America would be the biggest task, but this is my field of special competence.

RONALD J. MASON

Peruvian sources on the study of the Incas. JOHN V. MURRA

Andean South America (modern and selected). ALLAN R. HOLMBERG

Algonkian languages since Pilling. GORDON M. DAY

. . . linguistic borrowing or loan-words. LUC F. E. BOUQUIAUX

Language and culture, comprising topics such as the relations of linguistics and anthropology generally, and in field work; approaches to semantic description; "primitive" languages; language and world view; language in regard to personality and social structure; verbal art and speech surrogates. DELL H. HYMES

. . . reviews and publications on American folklore. JOSÉ ALCINA

. . . West Indies (including many untapped documentary and primary sources). EUGENIO FERNÁNDEZ-MÉNDEZ

Bibliography on Italian village studies (with S.C. Cappannari and Tullio Tentori). LEONARD W. MOSS

Finnish physical anthropology. KALEVI KOSKI

. . . African architecture from the beginning to modern times [and] African painting from the beginning until now. HERTA HASELBERGER-BLAHA

... concerning South African regions.

OLOF PETTERSSON

... material culture of British Central Africa (Rhodesias and Nyasaland).

BARRIE G. R. REYNOLDS

The Bushmen. . . . RÜDIGER SCHOTT

Political systems of non-literate peoples with theoretical works, and separate area sections for ethnographic works.

ROBERT A. LEVINE

Economic anthropology.

ANDREW GUNDEL FRANK

Ethnobotany. . . . SISTER M. INEZ HILGER

Anthropological contributions to the study of the aged individual.

OTTO VON MERING, JR.

Astronautic publications having anthropological significance.

PAUL H. NESBITT

It is suggested that a bibliography of references relating to field studies of primate behavior would be valuable to the increasing numbers of investigators in this little known field of research.

HAROLD J. COOLIDGE

#### Surveys of Collections

Nature and relative importance of major archaeological collections (none has adequately been studied) in Mesoamerican republics (Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama). . . .

ALFRED V. KIDDER, II

Photo [archives] . . . collections . . . held by museums, departments, bureaus, etc.

CHARLES LANGE

I think that unstudied ethnological collections might also be surveyed for various areas of the world, but I cannot personally offer to start assembling such material.

CATHARINE MCCLELLAN

I am already engaged in compiling an index to the osteological collections of the Great Apes in the United Kingdom in public and private hands. I hope to have this ready for publication in 1961.

JOHN R. NAPIER

I might contribute to the assembling of archaeological collections from Central America. I should recommend that there should be likewise regional researches covering the major ethnological collections, as far as not published up to date.

WOLFGANG HABERLAND

Survey of the major unstudied ethnographical collections in museums and private hands.

KUNZ DITTMER

Reference index of . . . collections and specimens from British Colonial Africa now . . . in museums throughout the world.

BARRIE G. R. REYNOLDS

A "bibliography" of known, documented collections of Taos Pueblo material culture. Eventually [such compilations] should be [made] for all the Pueblos.

ALFRED F. WHITING

Private and otherwise unaccessible collections of musical and other sound instruments.

CARL G. WIDSTRAND

I am very much interested in this project . . . and definitely recognize the importance of such documentation, but . . . it is a task of great enormity.

KENNETH B. DISHER

There is a great need for publishing the whereabouts and general nature of

the countless major unstudied archaeological collections in the world's museums.

RICHARD B. WOODBURY

. . . I am inclined to doubt that any one could do a useful article on unstudied collections without actually visiting the hundreds of museums that would be involved. . . . It often takes research on the spot by someone who knows the material to locate and assess the records that go with the specimens and give an archaeological collection its importance. . . . What might be done, perhaps . . . would be to establish a . . . department to which people who had knowledge of unpublished collections could contribute.

JOHN H. ROWE

. . . The projected project for publishing the whereabouts and general nature of the countless major unstudied archaeological collections in the world's museums appears to me to be a very worthwhile one. . . . I believe the project should definitely be extended to include ethnological collections as well. My own researches into problems of Plains Indian material culture have impressed me with the fact that many of the best early collections are in museums large and small in Europe, while other small outstanding collections are in localities in the United States where one would hardly expect to find them. Who would think, for example, that there is an outstanding Blackfoot Indian collection in Alabama? . . . The project must be one for broad collaboration among many specialists. . . . I should be very happy to contribute on the basis of my knowledge of the location of North American Indian collections in general and Plains Indian collections in particular. JOHN C. EWERS

**Erratum:** Vol. 1, No. 1, January, 1960, p. 62. The last paragraph should read "The compiler will appreciate notice of important omissions or errors, for use in later revision." Not the compiler but the printer (at the last minute) is responsible for omitting the last half of this sentence.

# Problems of Distribution and Adaptation of the African Monkeys

by N. C. Tappen

ALTHOUGH the interest of scientists in non-human primates has been widespread and persistent, surprisingly little is known of the behavior of the vast majority of species in their natural habitats. Yet this kind of information is crucial in understanding the evolution of the order and of man, and should be of great value in behavioral studies and medical research. Investigations on the localities in which primates live, and of the basic adaptations of the different species, are essential first steps. Even at this level there are great gaps in present knowledge, and what is known is widely scattered in the literature. This article attempts to remedy some of these deficiencies by reviewing what is known of the distribution of African monkeys and their fundamental ecologies. Some of the problems brought out by this review are discussed, for their possible interest and importance to anthropology. It is hoped that the information will be of use to field workers. This article is based on the literature and on field experience in British East Africa and in the Belgian Congo. Peculiarities of distribution of some of the monkey species in these countries led the author to undertake this study, since many of the problems involved are continental in scope.<sup>1</sup>

Ecological conditions in Africa may be conveniently classified in terms of the predominant vegetation, which is an effective indicator of the climate. The five main biotic types delimited by Moreau (1952) are very useful in understanding the distribution of the monkeys of the continent:

- (1) *Arid type*. Rain does not average more than 20 inches a year. At least six months of the year are very dry. The trees are stunted, usually deciduous, and thorny. Ground cover does not last throughout the year.
- (2) *Lowland evergreen rain forest*. This is dependent on good rainfall distributed over most of the year. Many of the trees are in fact deciduous, but usually are without leaves for only a brief period. In addition, different species shed their leaves at different times, so that the appearance of the forest is nearly always green. It is represented by the forests of coastal West Africa and the Congo Basin. Outlying patches are found as far east as the foot of the Kenya highlands. There are also evergreen forests along the eastern coastal belt.
- (3) *Montane evergreen rain forest*. This is to be found at altitudes higher than 5,000 feet above sea level in the tropics and at progressively lower levels farther south. In a number of places it is continuous with lowland forest, but the montane and lowland flora are very distinct from each other. The two largest areas containing montane forest are the highlands of Kenya and Abyssinia. A small area in the vicinity of Mount Cameroon in the west has this vegetation, and a number of detached areas in the east form, in Moreau's words, "an ecological archipelago separated by lower and drier country."
- (4) *Savanna*. This term is used to cover a wide variety of landscapes, from pure grassland to woodland other than closed forest. They are all subject to dry seasons too long to allow the growth of rain forest, even though the total yearly rainfall may be greater than that of some evergreen forest areas. The low humidity associated with the longer dry seasons rather than their absolute length may be the factor preventing forest growth, however (Rosevear 1953). The trees are predominantly deciduous, and perennial grasses form the main ground cover. This kind of country occurs from sea level to about 7,000 feet.
- (5) *Sub-alpine moorland*. This occurs above the timber line, beginning at a height of about 9,000 feet. It occupies only a few hundred square miles on the slopes of mountains that extend above this height. According to Chapin (1923), it is usually to be sub-divided into a lower zone, characterized by tree heaths, and an upper zone, above 12,500 feet, with giant arborescent groundsel and giant lobelias.

Moreau's map, locating the main areas of vegetational types (1), (2), (3), and (4) and their subdivisions, is

NEIL C. TAPPEN is Associate Professor of Physical Anthropology in the Division of Orthopaedics, Tulane University Medical School (New Orleans, Louisiana, U.S.A.). He was born in 1920, and as an undergraduate majored in English literature. His subsequent anthropological training was mainly at the University of Chicago (M.A., 1949; Ph.D., 1952).

The present paper is an outgrowth of field work in Africa, where TAPPEN was a Fulbright research scholar at Makerere College Medical School, Uganda, in 1956 and 1957. Submitted to CURRENT ANTHROPOLOGY in May, 1959, it was sent to seven scholars for CA treatment (see inside front cover). Comments were returned by Raymond A. Dart, Harry F. Harlow (jointly with John M. Warren), W. C. Osman Hill, Kinji Imanishi, Arthur J. Riopelle, and S. L. Washburn. The appended "Comments," and references to them in text or notes, are indicated by a star (\*).

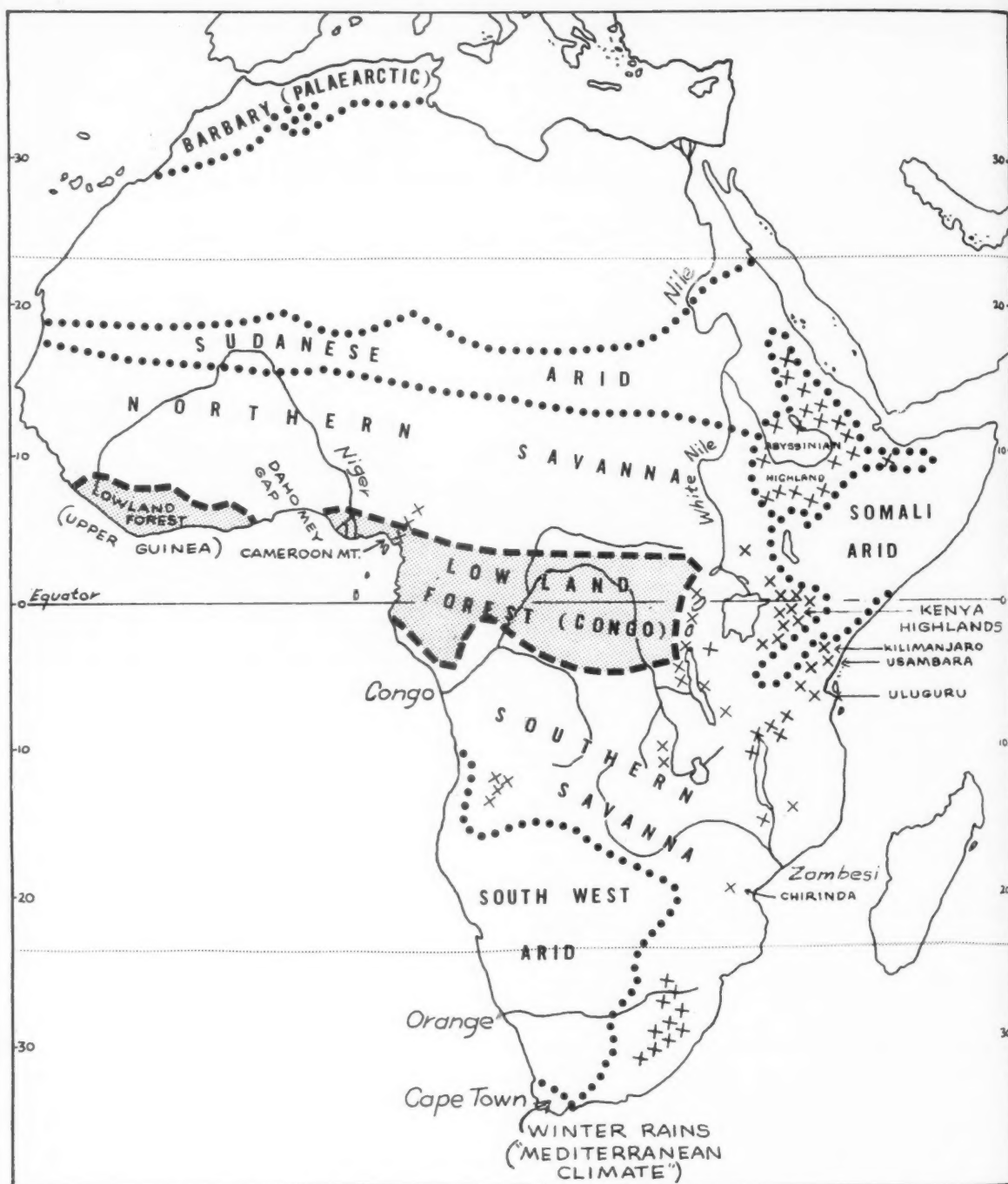


FIG. 1. Map showing main biotic divisions of Africa. Highland areas capable of supporting highland evergreen forest are marked with crosses. (After Moreau 1952.)

shown in modified form in Figure 1. Type (5) is too discontinuous and too small in area to be shown on this map, and there are also numerous small areas of montane forest which are poorly indicated or are not shown at all. Savanna and arid zones tend to grade into each other, but the transition to forest zones is abrupt.

It may be observed that small areas at the northern and southern fringes of the continent do not correspond to these vegetational types, and that the desert area north of the Sudanese arid zone is not labeled. There

are also micro-climates within the broad zones of the map, usually associated with abrupt changes in topography.

It should be noted that the great forests of West Africa and the Congo Basin are virtually continuous, except for an area of savanna which divides them at



Dahomey and Togoland, the Dahomey Gap.

In addition to his main biotic zones, Moreau distinguishes *gallery forests*, which are found along streams running through savanna. They depend on ground water rather than rainfall for their continuation. Moreau (1952:888) states that they are "physiognomically, though not floristically, equivalent to the poorer lowland evergreen rain-forest." He also distinguishes areas of *bamboo forest*, to be found on mountain slopes between the level of the montane forest and the zone of tree heaths.

Shantz and Marbut (1923) give a number of sub-classifications of vegetation zones not mentioned by Moreau, along with a discussion of the African soils, and include large and detailed colored maps of vegetation zones, rainfall, and soils. Rosevear (1953) has detailed maps of the vegetational zones of Nigeria and of the great forests of West Africa and the Congo Basin. Richards (1939) and Eggeeling (1947) have good discussions of some of the forests, and Michelmor (1939) discusses different kinds of grasslands. These, and similar articles, may all prove to be of great importance for primate studies when more is known about the primates themselves. In this article, they are referred to only where they have information particularly relevant to the problems discussed.

The initial review and discussion of distribution and adaptation of the monkeys is by taxonomic group. Special problems are outlined for each genus. In the final section, some more general problems of environmental relationships are discussed, and an attempt is made to show the potential value of this information to anthropology.

The classification of G. Allen's (1939) *A Checklist of African Mammals* is used,<sup>2</sup> except in those cases where personal experience or other information indicates that it is misleading. Some alternative generic and specific names are listed where they have been used extensively, although there is no attempt to outline the enormous tangle of synonymies which has grown up in the literature. Many of these may be found in Allen's checklist. Subspecies names are not listed, because the author tends to agree with those systematists who believe that the subspecies concept is a hindrance to taxonomic precision (Wilson and Brown 1953; Burt 1954), and because the vast proliferation of subspecific names encountered in the literature on African primates is all too often based upon too little information. Common names are given where they are known to the author.

To aid identification in the field or in zoos, locations of satisfactory and readily accessible illustrations are given for most forms. In cases of some of the less well-known species, any illustrations known to the author are recorded. Many of the illustrations are plates in *Proceedings of the Zoological Society of London* (hereafter *P.Z.S.*), though some of these plates are better representations of the coat color than of facial features and body build. In addition, Rode (1937) gives diagrammatic illustrations of the color and pattern of the pelt of many of the species, and named subspecies of African monkeys. Pocock (1907) gives drawings of the heads of species of the most varied African genus, *Cercopithecus*.

For general reference in locating the monkeys, Fig-

ure 2 contains the major political divisions of Africa and also circles of longitude and latitude.<sup>3</sup> For a closer examination of the discussions of distribution, a more detailed map is necessary. The National Geographic Society map of 1950, with its separate index, is adequate for basic orientation.

## FAMILY CERCOPITHECIDAE

### GENUS *Allenopithecus*

*Allenopithecus nigroviridis*, Allen's Swamp Monkey, was raised to generic status in a brief note by Lang (1923), on the basis of rather vague differentiating characteristics. It was classified as one of the guenons, genus *Cercopithecus*, in Pocock's (1907) monograph on this group; it was, in fact, included as one of the *C. aethiops* species group. Only one species is known. It is confined to the lowest part of the forest of the Congo Basin. It has been collected as far south as 3° S along the Congo River, as far east as 23° E in the vicinity of the Tshuapa River and along the Congo, and as far north as Karawa, between 3° and 4° N, according to Schouteden (1947). It has also been observed in French Equatorial Africa, in the region of the Likouala-Mossaka and Sangha tributaries of the Congo, near the Equator (Malbrant and Maclatchy 1949).

Available reports indicate that it is primarily adapted to swamps, but the manner of this adaptation is not recorded. Very little is known of its habits.

Photographs of *A. nigroviridis* are in Walker (1954) and in Schouteden (1947), and a colored drawing is in *P.Z.S.* (1908: 158, Fig. 1). The green coloring in this drawing is inaccurate, however, since the animal is predominantly gray (J. Allen 1925).

### PROBLEMS: GENUS *Allenopithecus*

The taxonomic status of Allen's Swamp Monkey is an open question, although its close relationship to the genus *Cercopithecus* is indicated. Its ecological relationships with other swamp-adapted monkeys, such as *Cercopithecus talapoin* and *Cercopithecus neglectus*, need to be determined. It occupies a geographical range separate from that of the Talapoin Monkey, although there may be overlapping of the two in French Equatorial Africa, west of the Congo River. *C. neglectus*, on the other hand, appears to be in much of the same area as *Allenopithecus*, and has a far more extensive range. This suggests that the Talapoin Monkey may have an ecology very similar to that of Allen's Swamp Monkey, while *C. neglectus* is not essentially a competitor. Field studies of *C. talapoin* and *A. nigroviridis* at the boundaries of their ranges should be very informative.

### GENUS *Cercocebus*. MANGABEYS

The mangabeys are widespread through the lowland evergreen forests. Schwarz (1928b) divides them into (1) a *Torquatus* group and (2) an *Albigena* group, each containing two species: (1) *C. torquatus* and *C. galeritus*, and (2) *C. albigena* and *C. aterrimus*. Allen (1939) lists these four species, along with subspecies for all except *C. aterrimus*.



FIG. 2. Map showing main political divisions of Africa.

Schwarz's grouping seems to cover the situation satisfactorily, except for *C. torquatus*. Booth (1956a) has shown that the previously accepted subspecies *C. torquatus torquatus* is very distinct from *C. torquatus atys* in its markings and size, not to mention a 500-mile gap between the ranges of the two forms. He therefore classifies them as separate species, *C. torquatus* and *C. atys*. This is followed here.

1. *C. torquatus*, the Red-Headed Mangabey, or White-Collared Mangabey, ranges from the lower Niger River to Gaboon, according to Allen (1939). Rosevear (1953) shows its distribution in Nigeria to be east of the

Cross River, about 8° E extending to about 6° N, and thus narrows its western range. Cabrera (1929) confirms its presence in Spanish Guinea. Malbrant and Maclatchy (1949) add the Middle Congo Province to its range, and Jeannin (1936) states that it is rare in southern Cameroons. It has not been reported from the Belgian Congo. It is abundant in the coastal regions of Gaboon and Middle Congo, but there are areas within 100 miles of the coast where it is absent, and its farthest penetration inland does not appear to reach the Congo

River. Its north-south range thus is from about 5° N to 5° S, and is probably much more restricted inland from the coast.

Malbrant and Maclatchy state that this monkey lives a partly terrestrial and partly arboreal life, and has been encountered in both primary and secondary forests, and along the banks of streams and on the aerial roots of mangroves. Its diet in the wild is stated to be berries and palm nuts. As with most African monkeys bold enough to come to the ground, it is a raider of native gardens, even digging for peanuts.

The Red-Headed Mangabey is the largest species of the genus, adult males reaching a weight of nearly thirty pounds. A painting of this animal is in *National Geographic* ([1938] 73:644), and a photograph is in Sanderson (1957:107).

2. *C. atys* is found in the far western coastal forests, from French Guinea, about 15° W, to central Ghana, approximately at the Greenwich Meridian. Booth (1956a) has plotted its distribution in Ghana, where it ranges inland about 200 miles. There are two distinguishable forms of this species: east of the Sassandra River of the Ivory Coast, about 6° W, is the White-Crowned Mangabey; west of it, the Sooty Mangabey.

According to Booth (1956a), this animal is to be found mainly in swampy forests with abundant palms. It is largely terrestrial, and readily invades secondary forest and farms. Booth has been able to determine little about the diet, except in animals which had raided native gardens. Mackenzie (1952) reports that it is the most destructive monkey in Sierra Leone, and a particularly serious menace to the cocoa crop.

A photograph of a Sooty Mangabey is in Walker (1954:107).

3. *C. galeritus*, the Agile Mangabey, is similar in size and appearance to *C. atys*, although of somewhat lighter color. Its range is from northeast Gaboon, about 12° E, nearly to the eastern limits of the great Congo forest, about 29° E. Its western limit seems to correspond closely to the eastern limit of *C. torquatus*. It ranges into southern Cameroons, where Jeannin (1936) reports that it is rare. It is not reported from the Bwamba extension of the Congo forest in Uganda, an area thoroughly studied by Haddow, Dick, Lumsden, and Smithburn (1951). It has been collected mainly near the courses of the Congo River and of such northern tributaries as the Ubangi, Uele, Itimbi, and Ituri, on the one hand, and along the Kasai and its tributaries to the south, on the other. It has not been reported from the Lualaba, nor between the Lukenie, about 3° S, and the northern limit of the Congo, about 2° N, except along the course of the Congo (Schouteden 1947). Thus two main linear east-west patterns of distribution are indicated.

This species is reported from one other locality, the swamp forest at the mouth of the Tana River, about 3° S 40° E (Allen and Lawrence 1936). Thus there is a gap of approximately 750 miles, one-third the breadth of the continent at this latitude, in what must have been a continuous distribution at one time.

The affinity of *C. galeritus* for swampy forest and the vicinity of rivers seems clear. Loveridge (in Allen and Lawrence 1936) reports that it spends much of the time on the ground, except in swampy country, and that it

raids rice farms. The similarity to *C. atys* is unmistakable. Malbrant and Maclatchy (1949) report that it favors the banks of rivers and the lower vegetation of the forest.

I was able to collect four specimens near Epulu in the Congo, about 2° N 28° E. They were on the ground some distance from the Epulu River when first observed, and fled through the trees toward the river.

Photographs of *C. galeritus* are in Schouteden (1947) and in Allen (1925).

4. *C. albigena*. The Gray-Cheeked Mangabey, also called the Black Mangabey (Haddow 1952), is very common in the equatorial forest. It ranges from coastal French Equatorial Africa, 10° E, through the forest of the Congo Basin and the Bwamba Forest in Uganda, 30° E. It is abundant in a number of the isolated forests to the east of Belgian Congo, extending to the Mabira Forest of Uganda, about 33° E 1° N, which is just west of the outlet of the Nile from Lake Victoria. In the west, it extends as far north as southern Cameroons (Perret and Aellen 1956). Neither Sanderson (1940) nor Rosevear (1953) reports it from Nigeria.

*C. albigena* is found on the right bank (relative to direction of flow) of the Congo River and the Lualaba. On the left bank is the very closely related *C. aterrimus*, the Peaked Mangabey or Black Mangabey, occupies much of the remainder of the Congo Basin forest. *C. opdenboschi*, which Schouteden (1947) places in territory to the left of the Kasai River, is also similar in appearance to *C. albigena*. These mangabeys are exclusively arboreal, and even have a partially prehensile tail (Haddow 1952). According to Malbrant and Maclatchy (1949), the bands are much more restricted in their range than are the other mangabeys. Their powerful and specialized jaws enable them to consume large and hard fruits that many of the guenons cannot handle (Haddow 1952). I have observed them feeding on several different kinds of hard fruits, as well as palm nuts, but they also compete with smaller monkeys for smaller and softer fruits.

A photograph of *C. albigena* is in Allen (1925); a photograph of *C. aterrimus* is in Sanderson (1957: 106).

#### PROBLEMS: GENUS *Cercocebus*

A number of problems concerning the mangabeys need to be mentioned. First, adaptational significance of the fairly extensive anatomical divergence of *C. torquatus* from the other species of the genus needs to be explained. It would appear, from their contiguous ranges and evident lack of extensive overlap, that *C. torquatus* and *C. galeritus* occupy very similar or identical ecological niches. The observations of their habits, though scant, tend to bear this out. Studies of the terrain in areas of contact between the two species, and close observations of their behavior, may give ready answers to this problem, and to a subsidiary question of whether the two species are in equilibrium or whether one is spreading at the expense of the other.

A second problem is, in a sense, a negative one, but is nonetheless important. Among the mangabeys, *C. albigena* and its closely allied species spread farther in the equatorial forest than does *C. galeritus*, and *C.*



*albigena* is found in the outlying patches of forest farther east, while *C. galeritus* is not. On the other hand, *C. galeritus* is found far beyond the limits of *C. albigena* in a single forest close to the Indian Ocean, and *C. atys*, probably closely related to *C. galeritus*, occupies much of the coastal forest west of the region where the savanna reaches the sea at the Dahomey Gap. This distribution encourages one to ask why the Black Mangabey does not have so extensive a spread. Its absence may give keys to the ecology of different forests not previously compared by this yardstick. On the other hand, it seems possible that *C. albigena* is a more recently evolved form than the others, and that continuous forest has not existed to allow its spread farther to eastern and western extremes of the continent since its original differentiation. Certainly *C. albigena* and *C. galeritus* are very similar in size and appearance, except for color, and the specialized masticatory apparatus is also similar in the two forms. It remains to be seen just what anatomical and physiological differences may be associated with differences in adaptation.

#### GENUS *Cercopithecus*. GUENONS

The taxonomy of the genus *Cercopithecus*, which includes the largest number of African species, is in the cases of several species still a matter of dispute. Review articles by Pocock (1907) and Schwarz (1928a) help to clarify much of the confusion in the extensive literature by showing that many of the species that have been variously named by different authors are synonymous. In a number of cases, very similar forms that undoubtedly fit generally accepted criteria of a species may be listed together as a species group (Mayr 1942). Allen (1939) follows Schwarz in listing nine species groups, but later work strongly indicates some of these to be in error. The classificatory changes that have been made here are discussed under (2) the *cephus* group, (4) the *l'hoesti* group, (6) the *mona* group, and (8) the *nictitans* group.

1. *C. aethiops* group. Green Monkey, Gray Monkey, Grivet, or Vervet, depending on locality and author.

This group almost certainly is actually a single interbreeding species, with only temporarily isolated local populations. It is to be found in savanna regions throughout Africa, from Senegal to Ethiopia, and from the Sudan to the tip of South Africa. It is rare or absent where arid conditions prevail. However, it has been reported by Bigourdan and Prunier (1937) to be found in the Air Massif, about 18° N 8° E, at the edge of the Sahara. This is not supported by Dekeyser (1950). It invades the brush at the edges of tropical forests, but is nearly always absent from their depths. It is not found in the Congo Basin forest.

Booth (1956b) in Ghana, and Malbrant (1952) in French Central Africa, agree closely in describing the habitat of the bands of these small monkeys. They are at home in wooded areas, though not rain forest. They generally feed in the trees, but may travel extensively in open country to reach other woodlands. They are most likely to be found along streams, where many of the trees are green throughout the year. They may be found in regions with long and severe dry seasons, and in well-watered areas where the savannas are frequently man-made. Near Lake Victoria, for example, they successively occupy separate small stands of rain-

forest remnant or second growth, from which they make forays into native gardens. Booth (1956b) reports that this species is mainly frugivorous, but that grass seeds have been recovered from the stomach of one animal. Native crops make up a large part of the diet in many regions.

A color photograph of this species is in Sanderson (1957: 105), although the amount of green in the coloration is almost certainly exaggerated. Good black-and-white photographs are in Schouteden (1947) and in P. Z. S. (1907: 732, 736).

2. *C. cephus* group. Mustache Monkey. Included in this group in this discussion are the closely related *C. ascanius*, the Red-Tail or Spot-Nosed Monkey; *C. erythrogaster*, the Red-Bellied Monkey; *C. erythrotis*, the Red-Eared Monkey; and *C. petaurista*, the Spot-Nosed Monkey. This view of the relationship among these species is held also by Booth (1956a), though he observes that *C. erythrogaster* does not provide the expected intermediacy of pelage between *C. petaurista* and *C. ascanius*. Sanderson (1957) also points out that the affinities of *C. erythrogaster* are still unsettled. Otherwise, these species have numerous physical similarities, often of a fairly precise nature, and frequently have similar ecologies, so far as can be determined.

Allen (1939), following Schwarz (1928a), included only *C. erythrotis* as a subspecies of *C. cephus*. He placed *C. ascanius*, *C. erythrogaster*, and *C. petaurista* in the *C. nictitans* group. However, Sanderson (1940) and Booth (1956b) have shown that one of the named subspecies of *C. nictitans* is entirely within the range of *C. petaurista*, while *C. erythrogaster* is entirely within the range of another subspecies of *C. nictitans*. Pocock (1907), Schouteden (1947), and Haddow (1952) also separate the two species groups, on the basis of clear physical distinctions.

*C. cephus* is very common throughout the forests of the Gaboon and Middle Congo regions of French Equatorial Africa, extending southward to the region just north of the mouth of the Congo River. It is found also in gallery forests extending into the savannas, which begin in these regions. Its northern limit, according to Sanderson (1940), is set by the Sanaga River, about 4° N where it flows into the Atlantic. Both Monard (1951) and Perret and Aellen (1956) report it from southern Cameroons. The eastern limit of the species is not clearly defined in the literature, but it does not extend beyond the Congo and Ubangi rivers. Schouteden (1947) records it only from the Mayumbe district north of the mouth of the Congo River in Belgian Congo. Malbrant and Maclatchy (1949) almost certainly err in their distribution map, which indicates that *C. cephus* is in the Belgian Congo along a wide front.

The Mustache Monkey is rare or absent in those parts of the forest which are lacking in *Elaeis* palms, according to Malbrant and Maclatchy (1949). Its main diet is the pulp of oil-palm nuts. These are rare in primary forest, being found rather in old clearings or forest edges. The Mustache Monkey also eats shoots and secondary-forest fruits. It does not voluntarily descend to the ground. Bands have well-defined territories and a leader, usually an adult male.

Color photographs are in Sanderson (1957: 88), and in *National Geographic* ([1956] 109: 109).



*C. ascanius* is found from northern Angola throughout the Belgian Congo forests, in many isolated forests of Uganda, and to the western edge of Kenya, about 35° E. It has not been reported from Ruanda-Urundi, and only from a portion of Tanganyika west of Lake Victoria. Its most southerly extent is the extreme north of Northern Rhodesia, about 24° E 12° S (Ellerman, Morrison-Scott, and Hayman 1953). Jeannin (1936) reports it from the coastal region of southern Cameroons, but this is not confirmed by Perret and Aellen (1956), nor does Cabrera (1929) report it from neighboring Spanish Guinea. In view of the absence of confirming reports, it is assumed here that Jeannin is in error. If this is the case, *C. ascanius* appears to be limited in its range to the left side of the Congo and Ubangi rivers, where they begin their southward course. It seems probable that *C. cephus* occupies the territory west of these rivers.

The distribution and habits of this monkey in Uganda have been recorded in considerable detail in Haddow's (1952) monograph, probably the most thorough study of any primate in the wild state. There are a number of similarities to the adaptations of the Mustache Monkey, including the tendency to haunt the forest edge and secondary forest, and relative rarity in primary forest. Its diet is quite varied, however, as Haddow has shown in extensive studies of stomach and cheek-pouch contents, and consists of fruits, young leaves, shoots, and a number of native crops where these are available. It is by no means reluctant to come to the ground, raiding gardens in determined fashion. It may even derive its entire subsistence from this activity in places where its original forest habitat has been cut down, although it does appear to need stands of trees to survive.

As evidence of its adaptability at the other extreme, it was found by the present author at all levels of the rain forests in the vicinity of the northwest shore of Lake Victoria. Here it shares occupancy only with the Black Mangabey, *C. albigena*. Haddow's characterization of *C. ascanius* as a forest-edge and secondary-growth animal staying principally in the lower and middle layers of the trees thus appears to be based mainly on studies in the Bwamba Forest, an extension of the Congo forest, where numerous other species are present to compete for the primary forest zones. Booth (1956a) has shown in West Africa how the Black Colobus Monkey (*Colobus abyssinicus*) invades the highest levels of the trees from its customary middle layers when the Red Colobus (*Procolobus badius*), which is rapidly being exterminated, is absent; the Green Monkey (*Cercopithecus aethiops*) will enter forest edge thickets not occupied by the Spot-Nosed Monkey (*Cercopithecus petaurista*), but otherwise avoids such areas. Similarly, it seems likely that *C. ascanius* will move into primary forest if there is not too much competition.

Haddow (1952) gives indirect evidence for defined territories for this guenon in the Bwamba Forest, but also states (personal communication) that the resident band in the small Zika Forest near Lake Victoria is joined from time to time by a much larger band from a nearby forest. He was able to observe no evidence of band leadership, except for a possible adult-male func-

tion in reorganizing a band after it had dispersed in alarm.

Two drawings of *C. ascanius* are at the end of Haddow's (1952) monograph. A photograph is in Allen (1925).

*C. erythrotis* has a discontinuous distribution, according to Sanderson (1940), one group being found on the island of Fernando Po, about 4° N 8° E, and another in the Ikom-Mamfe District of Nigeria, about 5° N to 7° N and 8° E to 10° E. A third group is found north of the Niger Delta, about 5° N to 6° N and 5° E to 7° E. The second group ranges north beyond the limits of the continuous coastal forest, and the third group overlaps in its distribution with the eastern limits of *C. erythrogaster*, which indicates clearly that the two are separate species.

Rode (1937) and Schwarz (1928a) regard *C. erythrotis* as a subspecies of *C. cephus*.

According to Sanderson (1940), the habitats of *C. erythrotis* in the Nigerian part of Cameroons are the upper layers in the coastal rain forest, and isolated patches of mountain forest north of the main forest. No other information on the habits of this species seems to be available.

A color photograph of *C. erythrotis* is in Sanderson (1957: 105).

*C. erythrogaster* is confined to the coastal-forest region of Nigeria west of the Niger River, according to Sanderson (1940) and Rosevear (1953). However, while Rosevear shows a distribution from about 4° E to 6° E, Sanderson gives a somewhat wider range, from about 3° E to the right bank of the river, about 7° E.

The uncertainty concerning the distribution of the species is matched by the lack of information about its fundamental ecology. There appears to be no published account of its habits in the wild.

A colored drawing of *C. erythrogaster* is in P. Z. S. (1866: 168).

*C. petaurista* is the form found west of the Dahomey Gap, but it ranges east of the rain forest region into Togoland. It ranges west as far as Liberia (Booth 1956a) and Sierra Leone (Mackenzie 1952). The western form is sometimes given the status of a species, *C. büttikoferi*.

Booth (1956b) characterizes this monkey as essentially a dweller in thickets, it being found in mature forest mainly where a fallen tree leaves a gap in the canopy and allows the growth of thick underbrush. It is found in swampy areas, forest outliers, fringing scrubland, and coastal scrub. It is found in middle and lower layers of the forests. It eats leaves as well as fruits. As a result of its varied diet, it can survive in small areas of forest and along forest margins. It is the commonest forest monkey in the Gold Coast. The similarity of its ecology to that of *C. ascanius* is evident.

A drawing of *C. petaurista* is in Dekeyser (1955: 144).

3. *C. diana* group. Diana Monkey and Roloway Monkey. Booth (1956b) considers the Diana Monkey and the Roloway Monkey to be subspecies of a single West African species, the Diana Monkey being found west of the Sassandra River of the Ivory Coast, about 6° W, and the Roloway Monkey to the east. Total range

is from Gambia, about 13° N 17° W to within 60 miles of the Volta River in Ghana, about 1° W, in the coastal forest. According to Jeannin (1936), *C. diana* is plentiful in southern Cameroons. This statement is probably incorrect. Rev. A. I. Good (personal communication) reports that he collected animals in Cameroons for forty years without ever seeing a Diana Monkey. Perret and Aellen (1956) do not list this species in Perret's collection of Cameroons mammals, a fact which would appear strange if these animals were common. Cabrera (1929) does not mention it in neighboring Spanish Guinea. Malbrant and Maclatchy (1949) do not report it from Gaboon and Middle Congo, nor Rosevear (1953) from Nigeria. Bates (1905) does not report it from Cameroons.

According to Booth (1956a), this species confines itself to mature forest, where it is to be found in the highest and middle layers, rarely descending below this level. On the basis of his examination of stomach contents, it seems to be entirely frugivorous.

Another species that appears to be very closely related to the Diana and Roloway monkeys has been reported on the strength of only two specimens (Schouteden 1947). It is *C. dryas*, collected at Lomela, Belgian Congo, about 2° S 23° E. Schouteden's photograph of a young animal shows definite resemblances to the Roloway Monkey. Nothing is known of its habits or range.

Color photographs of Diana and Roloway monkeys are in Sanderson (1957: 87), and paintings are in *National Geographic* ([1938] 73: 631).

4. *C. l'hoesti* group. L'Hoeist's Monkey and Preuss' Monkey. Schwarz (1928a) includes *C. l'hoesti* and *C. preussi* as subspecies of a single species. Hayman, writing in Sanderson (1940), argues that *C. preussi* is actually affiliated with the *albogularis* group (one of the named species or subspecies of the *C. mitis* group) of East Africa. Present evidence indicates the closer relationship of *C. preussi* to be with *C. l'hoesti*. The colored drawing of *C. preussi* in Sanderson (1940) shows close similarities to specimens of *C. l'hoesti* that I have observed, and does not resemble East African specimens of *C. mitis*.

Schwarz also states that *C. hamlyni*—Hamlyn's Monkey—is probably a subspecies of *C. l'hoesti*, and Allen (1939) follows this suggestion. *C. hamlyni* is little known, but the photographs of specimens in Allen (1925) and Schouteden (1947) reveal no close resemblance to *C. l'hoesti* nor to any other monkey, and it is regarded here as a separate species. Moreover, Schouteden's account indicates that the ranges of *C. l'hoesti* and *C. hamlyni* coincide extensively. Indeed, there is support for the belief of some authors that Hamlyn's Monkey should be placed in a separate genus (see below).

*C. l'hoesti* is found in the eastern part of the Congo lowland forest and in montane evergreen forests to the east in Belgian Congo, Uganda, and Ruanda-Urundi. In the lowland forest it ranges from about 26° E to its limits in the Belgian Congo, about 29° E, and from about 4° S to 3° N. In Uganda it is reported only from the isolated Ruwenzori and Kayonza montane forests (Haddow *et al.* 1951) in the western part of the country, and, in Ruanda-Urundi, from a series of similar high-

altitude forests. Its most easterly extent is, therefore, about 31° E.

L'Hoeist's Monkey is described in Haddow *et al.* (1951) and in Haddow (1952) as an inhabitant of high-altitude forests, and as largely terrestrial. In the Congo forest it is found at levels as low as 2,000 feet, however, and I have observed it in the trees in both lowland and very high forest. *C. l'hoesti* is another of the species that characteristically raid gardens.

Sanderson (1940) describes *C. preussi* as "essentially a highland form." It is found on the mountainous island of Fernando Po, about 4° N 8° E, on Mount Cameroons and Mount Victoria on the nearby Nigerian mainland, and in the higher parts of the forests to the north, extending to about 7° N. At the northern extremity, it is found in isolated patches of forest in the mountainous grasslands.

According to Sanderson (1940), these monkeys live in remarkable hanging nests; the natives claim that the monkeys make these nests themselves.

A colored drawing of *C. preussi* is in Sanderson (1940). A colored drawing of *C. l'hoesti* is in *P. Z. S.* (1898: 586). Photographs are in Schouteden (1947).

5. *C. hamlyni*, Hamlyn's Monkey, is known only from a few specimens, but these have been obtained at fairly widely scattered points in the eastern part of the Congo forest and at one location in northwestern Ruanda-Urundi. It has not been reported from Uganda. On the basis of this extremely sketchy evidence, the range appears to be from about 26° E to 29° E, and from about 2° N to 4° S (Schouteden 1947), and, in Belgian Congo, corresponds to that of *C. l'hoesti* quite closely.

There is a brief note in Allen (1925) indicating that this animal may be nocturnal in its habits. Other than its forest habitat, nothing else appears to be known of its adaptation.

It has been noted above that Schwarz includes *C. hamlyni* in the *C. l'hoesti* group, but that the present author would not. Further, Elliot (1913) describes for *C. hamlyni* a distinctive cusp pattern of the third molar, and therefore assigns it to a separate genus, *Rhinostigma*. As a separate genus, he believes it to be intermediate between *Cercopithecus* and *Cercocebus*, as does Allen (1925).

Photographs of *C. hamlyni* are in Allen (1925), Schouteden (1947), and Elliot (1913). A colored drawing is in *P. Z. S.* (1908: 158, Fig. 3).

6. *C. mitis* group. Diademed Monkeys. Locally distinct forms have various common names: Blue Monkey, Sykes Monkey, Gold Monkey, or Silver Monkey. Some authors refer to this group as *C. leucampyx*.

This monkey, primarily a forest form, has a distribution that is markedly different from the other species of the genus *Cercopithecus*. More or less isolated populations are found from Natal, South Africa, about 30° S 30° E, to southern Sudan, about 5° N. It has been reported from Transvaal, Mozambique, the Rhodesias, Nyasaland, Tanganyika, Kenya, Ethiopia, Somalia, Uganda, Belgian Congo, Ruanda-Urundi, and Angola. A considerable amount of difference in pelage has developed in local geographical representatives of this species group, and with it an abundance of separate species, or subspecies, names. It is recorded from forests

virtually at sea level along the east coast and neighboring islands such as Zanzibar, and from mountain forests as high as 10,000 feet. It is found in numerous places in the Katanga region of southern Belgian Congo, a wooded savanna containing gallery forests, and is very plentiful in the eastern part of the equatorial forest of the Belgian Congo. West of about 25° E, however, the specimens recorded are widely scattered and few in number, and it is not reported west of the Ubangi River boundary of the Belgian Congo, about 18° E. The one specimen reported by Schouteden (1947) from the Maniema district just north of the mouth of the Congo River is of doubtful origin. *C. mitis* is not recorded in Gaboon or Middle Congo by Malbrant and Maclatchy (1949). It has been reported from several localities in Angola, however, all in the northwestern part of the country near Luanda, about 8° S 13° E (Hill and Carter 1941). This last country is little known, however, and the distribution may be much more extensive there.

Schouteden (1947) states that *C. mitis* usually inhabits the deep forests, but is found also in gallery forest and savanna woodland. One form is found especially in high bamboo forests, while another is most frequently observed in swamp forests, and even descends into the treeless papyrus swamps to feed. The specimens collected by Loveridge (Allen and Lawrence 1936; Allen and Loveridge 1942) in Kenya and Tanganyika appear to be inhabitants of montane forests. In South Africa, Stevenson-Hamilton (1947) reports that it is usually found in thick forest. Shortridge (1934) does not report it from the arid Southwest Africa.

According to Haddow (1956), the forest forms of this monkey in Uganda subsist on fruits, leaves, and shoots. They are not usually raiders of native gardens.

Photographs of several named subspecies of *C. mitis* are in Schouteden (1947: 54-59). Colored drawings of several varieties are in P. Z. S. (1848: 56; 1892: 580; 1893: 243; 1902: 237).

7. *C. mona* group. Mona Monkeys. This species group has recently been studied in the light of modern species concepts by Booth (1955). On the basis of overlap in ranges and of morphological differentiation he defines five species: *C. campbelli*, *C. mona*, *C. pogonias*, *C. wolffi*, and *C. denti*. All are forest forms.

*C. campbelli* ranges from French Guinea, about 10° N 15° W, to the Volta River, Ghana, 0°, in the coastal forest. *C. mona* overlaps the eastern limit of *C. campbelli* slightly, and ranges as far east as the Sanaga River, Cameroons, about 4° N and 13° E. *C. pogonias* is found on the island of Fernando Po, and from about 7° N 9° E in the Nigerian part of the Cameroons, southward to the mouth of the Congo River and eastward to about 25° E. It is limited to the right side of the Congo River. *C. wolffi* is found throughout the forested area on the left bank of the Congo and its great tributary, the Lualaba. It thus extends as far east as about 26° E, and as far south as about 7° S. *C. denti* is the easternmost representative, occupying the right bank of the Congo and Lualaba, and extending to the easternmost boundaries of the great forest, the Bwamba Forest, Uganda, about 30° E (Haddow *et al.* 1951). It is also reported by Malbrant (1952) from the Ubangi-Shari District of French Equatorial Africa as far north as

7° N 20° E. It is not certain whether or not there is overlap of *C. denti* and *C. pogonias* at the extremes of the ranges in the Stanleyville District of the Belgian Congo.

Sanderson (1940) gives a much more restricted range for *C. pogonias*, limited to Fernando Po and the adjacent portion of the Nigerian mainland. He does not believe it is closely related to *C. mona*, and places the range of *C. pogonias* entirely within the range of the other species. Rosevear (1953) is essentially in agreement with this. However, Perret and Aellen (1956) report both *C. mona* and *C. pogonias* in southern Cameroons, and Malbrant and Maclatchy (1949) describe *C. pogonias* in Gaboon. Direct field experience thus tends to support Booth rather than Sanderson or Rosevear. Cabrera (1929) gives for *C. pogonias* essentially the same range as does Booth.

According to Booth (1956b), *C. campbelli* and *C. mona* are to be found in both primary and secondary forest and in forest outliers. They occupy the lower and middle layers of the trees, rarely ascending the highest trees. They are almost entirely frugivorous. Where the two species overlap, *C. mona* favors the river banks, and *C. campbelli* occupies the forest behind. In the non-overlapping parts of their ranges, no ready distinction of habitation zones has been observed.

Malbrant and Maclatchy (1949) state that *C. pogonias* inhabits secondary forest almost exclusively, but rarely approaches human habitations. It is usually in the company of *C. cephus* or *C. nictitans*. It is also largely frugivorous. Sanderson (1940) reports that it inhabits the summits of large deciduous trees at relatively high altitudes. The stomach of one specimen was crammed with insects.

Haddow *et al.* (1951) classify *C. denti* as mainly arboreal but occasionally descending to the ground. Haddow (1952) describes it as usually to be found in second-growth forest. It is much less likely to be seen at forest fringes than deep in the woods, however. It is seldom seen from the road in the Congo forest, where it is found in both primary and secondary forest. Haddow *et al.* (1947) reported that the stomach of one specimen from the Bwamba Forest, Uganda, contained little but leaves and shoots, with almost no fruit.

Photographs of *C. campbelli* and *C. mona* are in Booth (1955). A photograph of *C. pogonias* is in Malbrant and Maclatchy (1949: 25), and a colored drawing is in Sanderson (1940). A photograph of *C. wolffi* is in Schouteden (1947: 63). A photograph of *C. denti* is in Allen (1925), and in Schouteden (1947: 61). A colored drawing is in P. Z. S. (1907: 2).

8. *C. neglectus*. De Brazza Monkey. Sometimes named *C. brazzae*. This forest species extends from about 12° E in Gaboon and Middle Congo, from Spanish Guinea (Cabrera 1929) and southern Cameroons (Perret and Aellen 1956) through the area of drainage of the Congo River beyond the extent of the forest zone, and into isolated forest patches as far east as Mount Elgon, on the border between Uganda and Kenya, about 35° E. Its distribution in the Congo drainage area is very wide but appears to be discontinuous. Schouteden (1947) does not report it in many



parts of the Congo, although it is shown to be as far south as about 11° S. It is not found near Epulu on the river of that name, about 2° N 28° E, according to local Belgian game department officials, but is found along the Lindi River near Bafwasende, 120 miles away. It is not reported from Ruanda-Urundi. For Uganda it is reported in the Bwamba Forest, about 1° N 30° E (Haddow *et al.* 1951), from Mt. Elgon (Allen and Lawrence 1936), and from Mt. Kadam to the north, about 2° N 35° E (Watson 1951). I have also observed it in the forests southwest of Tororo, about 1° N 34° E. Nineteenth-century reports of this species from the White Nile are probably in error. Setzer (1956) does not mention its presence in the Sudan. The report of the specimen from the Omo River, north of Lake Rudolph, about 5° N 36° E (Thomas 1900), may be authentic, however. This location is in southern Ethiopia. Verification of this site would be of considerable interest, and would add dimensions to problems of distribution and adaptation of the species. According to Malbrant and Maclatchy (1949), it does not seem to reach the coastal region in its western distribution. This is supported by Schouteden (1947). It is found in southern Cameroons, according to Bates (1905) and Jeannin (1936), but is very rare in that region, according to the latter author. Rosevear (1953) does not report it from Nigeria.

Malbrant and Maclatchy (1949) describe habits for this animal in French Equatorial Africa which correspond closely to those observed in East Africa (Haddow, personal communication) and in the Congo (Chapin, personal communication). It has a strong tendency to inhabit swampy country and the vicinity of river banks, where it is to be found at lower levels of the forest. It goes in small bands as a rule, but single individuals are common. It is particularly likely to be found in bamboo and palm swamps. It shows considerable versatility, however, inhabiting the vicinities of swampy forests on Mount Elgon in East Africa. When danger threatens, it is likely to descend rapidly to the ground and make its escape along the forest floor. This has been observed by the present author and by local observers, near Tororo, Uganda. The characterization of *C. neglectus* as exclusively arboreal, by Haddow *et al.* (1951), is evidently not universally accurate.

There are reports from reliable sources that this monkey is not reluctant to swim across streams (Chapin, personal communication).

A color photograph of a De Brazza Monkey is in Sanderson (1957: 86). A painting is in *National Geographic* ([1938] 73: 632).

9. *C. nictitans* group. Putty-Nose Monkey. For reasons discussed previously, the species *C. ascanius*, *C. erythrogaster*, and *C. petaurista* are in the present paper included within the *C. cephus* group, rather than within the *C. nictitans* group.

In West Africa, the forest monkeys of the *C. nictitans* group are represented by one population that ranges from Liberia eastward to the Bandama River, about 5° W (Booth 1956a). Mackenzie (1952) reports that the "Putty-Nose Monkey" is destructive to crops in Sierra Leone, but he may be thinking of the Spot-Nose Monkey (*C. petaurista* of the *C. cephus* group). A second population is in Nigeria, from its western to its eastern

border and in outlying patches of forest as far north as 9° N (Rosevear 1953). A third subspecies is continuous with the Nigerian group, extending south in the coastal regions as far as the Ogooue River, about 1° S, and inland as far as about 15° E (Sanderson 1940). Cabrera (1929) gives the southern limit of distribution as Cete Cama on the coast of Gaboon, about 2° S. It is also found on Fernando Po, according to Cabrera. Malbrant (1952) reports it as being common in the gallery forests in the Ubangi region of French Equatorial Africa, ranging to 8° N. The distribution is therefore probably continuous with the Cameroons representatives, which Jeannin (1936) states are very common. Jeannin also observes that it extends north in the gallery forests, and he noted it as far north as about 7° N 14° E, in a climate "almost Sudanian." It is found in the northern part of the Belgian Congo, extending as far south as about 2° N and as far east as about 26° E (Schouteden 1947). Its southward distribution is limited by the Congo River and its tributary, the Itimbi. It is possible that its eastern and southern distribution is limited by that of *C. mitis*, which is believed by some authors to be closely related.

According to Malbrant and Maclatchy (1949), *C. nictitans* inhabits both high secondary forest and lower layers of brush in the forests of French Equatorial Africa. Bands are narrowly localized and do not encroach on each other's territory. It eats shoots and fruits of the secondary forest. Ants were found in the stomach of one individual. It rarely comes to the ground, even to traverse gaps in the forest. These authors report that solitary individuals steal chickens and take them back to the trees to eat, however.

Booth (1956a) reports that the western representative of this group, *C. nictitans stampflii*, is confined to primary forest and appears to inhabit the upper layers of the trees. *C. nictitans martini* in Nigeria, on the other hand, is found at all levels of the primary forest, in secondary forest, and in brush country resulting from farming. The two forms are separated by a 400-mile gap, but their physical distinctions are inconstant.

Photographs of *C. nictitans* are in P. Z. S. (1907: 697), Schouteden (1947), and Malbrant and Maclatchy (1949: 25).

10. *C. talapoin*. Talapoin Monkey. Some writers put the Talapoin Monkey in a separate genus, *Miopithecus*. It is the smallest of African monkeys, attaining a weight no greater than about four pounds, according to Malbrant and Maclatchy (1949). These authors give its localities in French Equatorial Africa as the forested regions of Gaboon and at least the western, northern, and northeastern parts of Middle Congo. It is frequently encountered in the forests of southern Cameroons, according to Jeannin (1936). Perret and Aellen (1956) record two specimens from this region. Cabrera (1929) states that it is common in Spanish Guinea, but that specimens sold to travelers on Fernando Po had been brought to Fernando Po from the mainland. Schouteden (1947) reports it from the Lower Congo District of Belgian Congo, the region just north of the mouth of the Congo River. It has also been reported in several places in Angola, as far south as about 12° S (Hill and Carter 1941). It thus appears to be confined largely to areas along the Atlantic coast.



A single specimen has been reported from the Congo side of Mount Ruwenzori, about 30° E near the equator, at a height of 2,500 meters (Lönnerberg 1919). The skull has been lost, according to Schouteden (1947), and no other specimens have been recorded from the Ruwenzori. This mountain range does contain high-altitude swamps, however; confirming evidence would be of great interest, because of the implications for the adaptability of this species and for its history.

According to Malbrant and Maclatchy (1949), this monkey is to be found in the low brush of abandoned farms, in swamp country, along streams, and particularly in mangrove swamps near the coast. In Gaboon, it is known as the Mangrove Monkey. It is sedentary in its range, and avoids human habitation. It will overcome its fear in order to steal papayas, however. It feeds on palm nuts, fruits, seeds, leaves, and flowers.

A painting of Talapoin Monkeys is in *National Geographic* ([1938] 73: 642). A photograph is in Malbrant and Maclatchy (1949: 40).

#### PROBLEMS: GENUS *Cercopithecus*

The distribution and adaptation of the species of the genus *Cercopithecus* will be much better understood when the degree of relationship of a number of the forms is known. Some of the problems of taxonomy have already been mentioned in the accounts of the different species groups, but it needs to be emphasized that the interpretation of the distribution of a number of the existing forms is dependent upon knowing whether or not some of the widely separated groups of monkeys are actually closely related. Thus the dispute over *C. preussi*—whether it is closely related to *C. lhoesti* or to *C. mitis* or neither—is of great importance in understanding the history of the last two species, since neither is otherwise represented in western Africa. This problem may be further complicated by the suggested affinities of *C. mitis* to *C. nictitans*.

Similarly, the question of the relationship of *C. dryas* to *C. diana* is important in interpreting the history and adaptation of the latter group. This is also tied in with the highly questionable information in Jeannin (1936) as to the presence of *C. diana* in Cameroons, since it is of importance to know whether or not representatives of the *Diana* group are to be found east of the Dahomey Gap.

The extent of the differentiation within species groups in which there is not a wide separation in ranges, but rather a problem of overlap, has had only preliminary attention. Booth's (1955) field work on speciation in the *Mona* monkeys is a model of the kind of work that needs to be done along these lines. His actual field work was confined to a restricted area in the west, however; three of his five species are extrapolations, and show discrepancies with Schouteden's (1947) subspecies grouping for *C. mona*. There is a similar problem of the extent to which different monkeys in the widespread *C. cephus* group have clearly defined ranges, overlap each other, or are actually locally differentiated segments of interbreeding populations. The Cameroons-Nigeria forest is especially critical in this regard, since *C. cephus*, *C. erythrotis*, and *C. erythrogaster* are in the area.

The evidently great adaptability of *C. lhoesti* to both

high-altitude forests and lowland forests, and to both arboreal and terrestrial existence, is associated with a relatively restricted range. This poses the problem of the possible factors limiting its distribution. It is suggested here that the most important one may be a food or foods in the undergrowth. Shantz and Marbut (1923) observe that montane forests in Africa have a greater variety of vegetation on the forest floor than do lowland forests. Perhaps *C. lhoesti* is unable to compete with other monkeys beyond the range of distribution of some favored food plant growing close to the ground. Investigations of *C. preussi* may help in the solution to this problem, if it proves to be closely related to *C. lhoesti*.

The mysterious *C. hamlyni* is not well enough known to afford problems at any other than a preliminary descriptive level. Questions of its relationships are dependent upon the collection of more specimens. Its possible nocturnal habits need further investigation. Its range, while restricted, appears to be great enough to indicate that it is not simply an unsuccessful remnant.

The *C. mitis* group is primarily in the eastern and southern parts of the continent. No other monkey shows this distribution, and only *C. aethiops* and baboons extend south to a similar extent. These last two are well adapted to savanna country, however, and their continent-wide distribution reflects the extent of this type of vegetational zone. While some forms of *C. mitis* are said to be adapted to savannas, the majority seem to be animals of rain forests or gallery forests. The extent to which *C. mitis* actually is a savanna form, and what its ecological adjustment is in savannas, have not been well documented. The fact that *C. mitis* forms extend to South African forests is therefore not so easy to explain as is the range of baboons and *C. aethiops*, nor is the problem of why it extends so much farther south than other forest species of the genus *Cercopithecus*. Possible alternative explanations are of considerable interest in problems of the climatic history of Africa and the evolution of its monkeys, and will be discussed below.

Booth (1956a) observes that the *C. nictitans* group of West Africa shows resemblances to the *C. mitis* group, and Haddow (1952) also believes the two are closely related. It is possible that they have much the same basic ecology. Schouteden's (1947) maps showing the places where specimens have been collected indicate that, in the area between the Ubangi and Congo rivers, the two species are contiguous but do not overlap in distribution. Only a few specimens and localities are represented, however; further studies are needed.

It has been indicated by Haddow (1952) that there may be partial competition between *C. ascanius* of the *C. cephus* group and *C. denti* of the *C. mona* group. No monkey of the *mona* group is found east of the Bwamba Forest of extreme western Uganda, which is really an extension of the great equatorial forest of the Congo, while *C. ascanius* is very common in the isolated forests to the east. This is to be expected, in view of the adaptability of *C. ascanius* to brush country and secondary forest. However, *C. ascanius* is not reported by Malbrant (1952) in French Equatorial Africa north of the great forest, while *C. denti* has been observed there. It

should be of considerable interest to examine this locality with the hypothesis that the presence of *C. denti* represents a relic of the expansion of the forest zone before *C. ascanius* had extended its range into this area. It should be noted that Schouteden (1947) reports *C. ascanius* from the extreme northwestern tip of Belgian Congo, approximately 100 miles to the south. Interestingly enough, the representative of the *mona* group in this same locality is *C. pogonias* (Schouteden's *C. mona grayi*), rather than *C. denti*.

On the other hand, the principal *mona* representative in Nigeria, *C. mona*, is widespread throughout the southern part of the country, while *C. erythrotis* of the *cephus* group has a spotty distribution in Nigeria and on the island of Fernando Po. The range of *C. erythrogaster*, with probable relationships to the *cephus* group, is also quite restricted. It seems quite possible that the habits of *C. mona* in Nigeria may resemble those of *C. ascanius* more than those of *C. denti*. This kind of shift or exchange of adaptation may be quite common in African monkeys; it is well documented in the case of representatives of *C. nictitans* from Ghana and from Nigeria (Booth 1956a).

*C. neglectus* also has a spotty distribution, both in the main equatorial forest and in isolated places to the east. Local differences in appearance are evidently negligible, as has been observed repeatedly by museum taxonomists. This may indicate that the outlying populations have become isolated relatively recently. In any case, the peculiar distribution of these eastern representatives raises questions concerning their history and the climatic conditions that allowed their spread and then isolated them in swamp forests and mountains north of Lake Victoria. There are numerous other swamp forests and mountain regions west and south of the lake, but no reports of De Brazza Monkeys inhabiting them. Analysis of the conditions associated with the evidently spotty distribution of *C. neglectus* in the equatorial forest may give clues to this general problem.

The factors confining *C. talapoin* to a north-south distribution along the western coast of Equatorial Africa and Angola remain to be ascertained. It is possible that its eastward spread is hampered by another swamp-adapted monkey, *Allenopithecus nigroviridis*. Lönnberg's (1919) report of a single specimen from Mount Ruwenzori, more than 800 miles east of its range in French Equatorial Africa, is not adequately documented and has not been confirmed. If it should be verified, this species will of course be shown to have had a much wider range, and the Ruwenzori inhabitants would then probably have to be regarded as occupying a refuge zone.

#### GENUS *Erythrocebus*. RED MONKEYS, PATAS MONKEYS, HUSSAR MONKEYS, NISNAS

*Erythrocebus patas* is the only species of this genus, according to most present-day writers. It shows many basic similarities to the genus *Cercopithecus*, and was included in that group by Pocock (1907).

The Red Monkey is found in savanna country from Senegal in the west to the Sudan in the east, south to the northernmost part of Tanganyika, about 2° S 35° E. It ranges from the edge of forested country into "Sahel Savannah" with less than 20 inches of rainfall and an

eight-month dry season in West Africa (Rosevear 1953), beyond the northern limits of Nigeria. In French West Africa it is found as far north as the Air Massif at the edge of the Sahara, about 18° N 8° E, according to Bigourdan and Prunier (1937). It generally ranges farther north into drier country than does *Cercopithecus aethiops* in French Equatorial Africa, according to Malbrant (1952), who puts its probable northern limit in that territory as the vicinity of the Ennedi Plateau, about 18° N 22° E. It is common south of the 15th parallel in French territory. Schouteden (1947) reports it from several localities just north of the forest belt in the Belgian Congo. Setzer (1956) reports it only from the vicinity of the Marra Mountains, about 13° N 25° E, and the Imatong Mountains at the southern tip of the Sudan. The extent to which it ranges the rest of the country is not stated. In Uganda its limit appears to be the right bank of the Victoria Nile complex of rivers and lakes. I observed a band near a village close to the northeastern shore of Lake Kioga, about 2° N 33° E. Haddow *et al.* (1951) show it in one locality south of the lake in their map of the sites of collection of monkeys. The text shows clearly that this is the result of an error of transposition, however. It has been collected in the western part of the Kenya highlands, about 1° N 35° E. (G. Allen 1939). Its reported southern extremity is Ikoma, Tanganyika, about 2° S 35° E. This may be an isolated outpost; the original report dates back to 1905, and no further information seems to be available.

The Red Monkey is adapted to savanna country to an extent not duplicated by other monkeys. It is a large monkey, adult males reaching sixty pounds. The length of its legs is striking, and it runs with great speed if disturbed. It stays almost exclusively on the ground, except perhaps to feed and to act as lookout. Bands evidently range over a very wide territory, and at times gather into aggregations of more than one hundred. The smaller groupings are normally dominated by a single adult male, according to Bigourdan and Prunier (1937).

According to Booth (1956b), very little is known of the habits of this animal beyond that of raiding native crops. It avoids denser cover, but is adept at hiding among low bushes. It is justly reputed to be one of the most difficult animals in the world to hunt.

Photographs are in Sanderson (1957: 106) and Walker (1954: 121). The painting in *National Geographic* ([1938] 73: 644) shows the vivid red color attained by some individuals.

#### PROBLEMS: GENUS *Erythrocebus*

The wide and nearly continuous distribution of *Erythrocebus* across the northern part of Africa, and the almost abrupt termination of its range in East Africa, is difficult to correlate with environmental differences between that region and the southern half of the continent. Certainly the ranges of the other monkeys usually associated with savannas, the baboons and *Cercopithecus aethiops*, are not similarly restricted, nor are those of a great many savanna ungulates and carnivores. Moreover, the Red Monkeys seem highly adaptable.

In Karamoja in the northeastern part of Uganda, a savanna country with a long dry season, the Red Monkeys occupy a different part of the environment from

the other savanna monkeys. The Gray Monkey (*C. aethiops*) does not seem to stray far from the streams, even when these have dried up. Here there are more and larger trees utilizing the ground water, and they retain their leaves. The local baboon, *Papio doguera*, is to be found on and near the volcanic outcroppings that occur irregularly. The Red Monkeys range over the relatively flatter ground. The amount of competition between the species therefore does not appear to be great. This is essentially the situation Booth (1956b) describes for comparable country in Ghana.

Several possible explanations for the absence of the Red Monkey east of western Kenya and south of northern Tanganyika present themselves. The hypothesis that the country is too high can probably be dismissed, since there are persistent colonies on very high plateaus at the edge of the Kenya highlands. It is possible that some basic food is missing beyond the range of the Red Monkey, although vegetation maps give no ready clues to its nature. The country to the south may differ sufficiently from its own so as to put the Red Monkey directly into competition with baboons or Gray Monkeys. For example, there is much more wooded savanna in the southern half of the continent, which generally receives more rainfall than the northern savannas (Shantz and Marbut 1923). However, Red Monkeys flourish in wooded savanna in the Teso and Mbale Districts of Uganda, perhaps even better than in the more open country farther north.

More will have to be learned about the adaptation of the Red Monkey if these hypotheses are to be tested. It will be a formidable task, since this animal is very difficult to collect, or to observe for more than a brief period.

Finally, it is possible that *Erythrocebus* is still expanding its territory and will eventually spread far southward, or would if European civilization had not changed an older situation. Its presence at the edge of the Kenya highlands may indicate such an expansion. If this is the case, the present adaptation of *Erythrocebus* must have been relatively recent, or severe barriers to its expansion must have existed over long periods of time. The first possibility is perhaps to be doubted because of the physical specialization of this species, although there are no established evolutionary "laws" to eliminate it from consideration. The second is not supported by Moreau's (1952) discussion of past climates in Africa, although it is possible that climatic changes in the past caused the extinction of the Red Monkey in the southern and eastern part of the continent.

Further biological and paleontological studies may help in the solution of these problems, along with the important question of the relationship of *Erythrocebus* to the species of the genus *Cercopithecus*. In some respects, *C. aethiops* seems to be intermediate in adaptation and structure between *Erythrocebus* and the forest-dwelling guenons. When enough is known of the genetics of the various species, it should be possible to decide whether the two savanna species had a relatively recent common ancestor or whether they represent independent invasions of new environments.

#### GENUS *Macaca*. MACAQUES

*Macaca sylvanus*. Barbary Ape. This is the only macaque in Africa, and the only monkey living wild

north of the Sahara. It is found in the mountainous coastal regions of Algeria and Morocco and on Gibraltar, and, according to Forbes (1897), some distance inland in Spain. According to Sanderson (1957), it is found in coniferous forests and on rocky hills. He reports that it feeds upon the kernels of pine cones, and upon fruits, nuts, vegetables, and grass shoots. It is also a raider of farms. According to Forbes, it is much more at home in trees than on level ground. However, Rode (1937) states that it is an inhabitant of mountains and rocky regions and is less arboreal than the other African monkeys.

A painting of Barbary Apes is in *National Geographic* ([1938] 73: 630). A photograph is in Rode (1937), and in Montagu (1951: 62).

#### PROBLEMS: GENUS *Macaca*

Sanderson (1957) suggests that the Barbary Ape may have been introduced into North Africa in historic times. Since it is different from other existing macaques, and since fossil macaques have been discovered in Europe from eras as recent as the Pleistocene, this seems unlikely. The commonly held assumption that it was introduced into Europe from North Africa is not demonstrated either, according to Forbes (1897).

If one assumes that this species is a survivor of a macaque distribution that was once continuous, reference to it may be helpful in assessing the faunal connections between Europe, Africa, and Asia during earlier epochs. This will be taken up in the general discussion of distributional problems, below.

#### GENUS *Mandrillus*. MANDRILLS AND DRILLS

Some authors include the *Mandrillus* forms in the genus *Papio*, to which they undoubtedly are fairly closely related.

1. *Mandrillus sphinx*. Mandrill. This species is confined to forested country in French Equatorial Africa and Spanish Guinea. It is a very large baboon, males being reputed to weigh over one hundred pounds. The following account is taken mainly from Malbrant and Maclatchy (1949). It is found throughout the forested region of Gaboon and Middle Congo, extending into southern Cameroons as far as the Nigerian border (Jeannin 1936). It does not extend beyond the right bank of the Congo River, nor does Schouteden (1947) report it from the Belgian territory at the mouth of the Congo River.

The Mandrill is terrestrial rather than arboreal, and appears to be localized in those parts of the forest where the undergrowth is thin enough to allow free movement. According to Jeannin (1936), in Cameroons it seems to prefer mountainous regions. It climbs trees of no more than moderate height, for feeding or resting purposes. It eats seeds, fruits, shoots, and probably insects. During the dry season it is likely to raid manioc gardens.

A photograph of a Mandrill is in Sanderson (1957: 110), and a painting is in *National Geographic* ([1938] 73: 641).

2. *Mandrillus leucophaeus*. Drill. The Drill is similar in size to the Mandrill. It is also essentially a forest



form. Its range begins in the extreme southeastern corner of Nigeria, extending to about 6° N, and continues in Cameroons. Sanderson (1957) states that its southern limit is the Sanaga River in Cameroons, about 4° N, but Malbrant and Maclatchy (1949) describe it as relatively abundant in Gaboon and Middle Congo, and limited by the Congo River. They state that there are gaps in its distribution in the forest, however, in contrast to the Mandrill. It is probable that Malbrant and Maclatchy are correct, rather than Sanderson. If these authors have not personally observed some animal species or subspecies in their area, they so state. They do not make this statement in the case of the Drill. Cabrera (1929) reports both Mandrills and Drills from Spanish Guinea, and a form of Drill from the island of Fernando Po, which is distinct enough to regard as a separate species, *M. poensis*.

Bates (1905) states that Drills are not plentiful in southern Cameroons, and that they keep to the depths of the forest, remote from villages. His account appears to coincide closely with that of Malbrant and Maclatchy, inasmuch as it tells how this animal apparently forages mainly on the ground for roots, nuts, and other plant food, and that it sleeps in trees.

The Drill seems to follow the same cycle of migrations as the Mandrill, according to Malbrant and Maclatchy.

A photograph of a Drill is in *National Geographic* ([1931] 59: 230), as is a painting ([1938] 73: 640).

#### PROBLEMS: GENUS *Mandrillus*

While the available accounts are rather sketchy, both the Mandrill and the Drill appear to have much the same adaptation to the floor of the forest. If it should be verified that there is overlap in the ranges of the two forms, the different parts of the environment which are being exploited need to be determined. Information on the extent of the overlap, or on the exact location of the boundary, would perhaps reveal a great deal regarding the nature of their differentiation. Correlation of the gaps in the distribution of the Drill (reported by Malbrant and Maclatchy 1949), with the nature of the forests in these areas, needs to be made.

#### GENUS *Papio*. BABOONS

G. Allen (1939) lists five species of the genus *Papio*, but regards one of these as a probable individual variation. Following J. Allen (1925), he places the Hamadryas Baboon in a separate genus, *Comopithecus*. Since these taxonomic placements are based on vague, and at times inaccurate, information (Moreau, Hopkins, and Hayman 1946), both the validity of the species and the distinction of the genus *Comopithecus* are open to question. It is even possible that the Hamadryas Baboon is a geographical variation of a single species. In no case have I been able to find evidence of overlap in ranges of the different named species of the kind reported by Booth (1955) for Mona monkeys. The crucial studies on the problem of speciation in baboons have yet to be made. However, the species named by Allen are listed below, with some discussion.

1. *P. comatus* (*P. porcarius*). Chacma Baboon. This form is found in South Africa, southwest Africa, western Angola, and Bechuanaland.

2. *P. cynocephalus* (*P. kindae*). Yellow Baboon. This form is found in Angola east of the Cunene River at about 15° E (Hill and Carter 1941), in central Rhodesia, in Nyasaland, in Mozambique, in the southern savanna part of the Belgian Congo up to nearly 4° S (Schouteden 1947), and in Tanganyika at least as far as the northeastern corner (*Tanganyika Game Department Annual Report* 1953).

3. *P. doguera* (*P. anubis*). Anubis Baboon, Olive Baboon. This form is found in the Kenya highlands, in many parts of Uganda, in the eastern and northern parts of Belgian Congo including much of the forest on the right side of the Congo River, and, in all probability, across the savanna region north of the forest belt to the western extremity of the continent. It is found in Sudan as far north as the Marra Mountains, about 13° N 24° E (Setzer 1956). Farther west, Bigourdan and Prunier (1937) report it from the Tibesti Massif, about 20° N 16° E and from the Air Massif, about 18° N 8° E. It thus ranges farther north than any other monkey found below the Sahara.

4. *P. papio* may be a construct from the taxonomic literature of the early part of the nineteenth century, since the few definite localities given for it in Allen (1939) are within the range of *P. doguera* in western Africa. Rosevear (1953) and Booth (1956a, b) list only *P. doguera* for Nigeria and the Gold Coast and Ivory Coast. Dekeyser (1956) gives the name *P. papio* to the baboons of the extreme western part of the continent, from Senegal to Sierra Leone, but states that their eastern limit is not known with precision. The specific distinction of *P. papio* from *P. doguera* appears highly questionable.

5. *P. pruinosis*, from Nyasaland, is dismissed by Allen (1939) as probably an individual variation.

6. *P. hamadryas* (*Comopithecus hamadryas*). Hamadryas Baboon. As stated above, the generic status given this form does not appear to be supported by much evidence. Allen (1939) gives one of its localities as eastern Sudan, but Setzer (1956) reports only *P. doguera* from that country. For Ethiopia, Allen states that *P. hamadryas* is found mainly in the lowlands. It is also found on the Arabian Peninsula near Aden, 3° N 45° E, but the range is not known. Its range in Ethiopia does not seem to be established, either. From Blanford's account (quoted at length in Elliot 1913), it is evidently widespread in northern Abyssinia, ranging from the desert country along the coast to areas of the plateau over 9,000 feet in elevation.

Baboons are encountered in a wide range of climate and altitude, from rain forest to country with long dry seasons, and from coastal plains to high plateaus and projecting mountaintops. R. Dyson-Hudson (personal communication) reports that they are numerous atop Mount Napak in northeast Uganda, 8,300 feet above sea level and approximately 4,000 feet above the surrounding plain. Here they are a menace to the crops and even to the storehouses of the natives.

Stevenson-Hamilton's (1947) description of the habits of baboons in South Africa corresponds closely with that of Booth (1956b) from the Gold Coast. A troop uses a rocky eminence as its central refuge and nightly sleeping quarters, if any is available in the area. In heavily forested country, it sleeps in large trees. It may feed in



thick bush or open country. According to Booth, the baboon is more terrestrial in its habits than the Green Monkey (*C. aethiops*), ascending trees only to feed or rest.

In the Congo forest, I always encountered it on the ground in areas close to human habitation and fairly recently cleared of forest. It seems possible that its deep penetration into the forest region is associated with the invasion of the area by agricultural tribes. However, the *Tanganyika Game Department Annual Report* (1953) states that it is found in all types of bush country, from thick climax rain forest to open Masailand scrub, but that it is much more common in the former. Since there are fewer monkey species in Tanganyika forests than in the Congo, it is possible that baboons can with less ecological competition establish themselves in the former territory.

The diet of baboons is widely varied, and includes a variety of fruits, roots, tubers, insects, and even birds and small mammals (*Tanganyika Game Department Annual Report* 1953). According to Booth (1956b), the baboon can deal with very large and tough fruits such as the baobab, which can be eaten by few other mammals. It is probably the most destructive raider of gardens of all African monkeys, eating everything from peanuts to young cotton buds.

According to Shortridge (1934), *P. comatus*, the Chacma Baboon, stays mostly on the ground in rocky country. *P. cynocephalus*, the Yellow Baboon, is a tree-dweller, and appears to avoid open country. Shortridge is undecided about the specific distinctness of the Chacma and Yellow baboons.

The habits of *P. hamadryas* appear to differ slightly from those of other baboons, from Blandford's description (quoted in Elliot 1913). It is seldom seen in trees, and appears to avoid woods. Otherwise, its propensity for a rocky habitat seems to coincide closely with that observed so frequently for other baboons.

A photograph of *P. doguera* is in Sanderson (1957: 110), labeled *Papio papio*, and a photograph of a Hamadryas Baboon as well (p. 111). A painting of this form is in *National Geographic* ([1938] 73: 645). There are numerous photographs of Hamadryas Baboons in Zuckerman (1932).

#### PROBLEMS: GENUS *Papio*

The status of the species of baboons is open to question. Field work needs to be done to determine the boundaries of the different named groups, and if there is interbreeding. The reason baboons penetrate deep into the northern and eastern parts of the Congo forest but not into the forest farther west is not clear. The presence of Drills and Mandrills may explain this in French Equatorial Africa and Cameroons, but not in the more westerly forests. Studies of the ecology of baboons in the rain forests of eastern Africa, where there is a relative paucity of monkey species to compete, may help in the solution of this problem.

#### GENUS *Theropithecus*. GELADA, OR GELADA BABOON

*Theropithecus gelada*. This very large monkey is basically different in the form of the face from the genus *Papio*, in spite of evident similarities of habitat. Its affinities are with *Cercopithecus* rather than with *Papio*

or *Macaca*, according to Forbes (1896). There is probably only a single species, confined to very high country in Ethiopia.

Allen (1939) and Elliot (1913) make southern Ethiopia the range of this animal, but the actual localities listed by their sources indicate that it has in fact been reported only from the northern part of the country as it is now constituted. The southernmost listed locality is near Magdala, about 12° N 39° E, and the northernmost is near Aksum, about 14° N 39° E. The nineteenth-century conception of Ethiopia has been repeatedly propagated in later accounts of the distribution of this monkey, without reference to the actual vicinities where it has been reported. Its range in the Ethiopian highlands has yet to be reported accurately.

According to Rüppell and Von Heuglin, both quoted at length by Elliot (1913), the Gelada is to be found at elevations above 6,000 feet. It is seldom seen in trees, and lives typically in rocky ravines or rocky open places. Rüppell reports that it feeds upon seeds, roots, and tubers, and seldom raids cultivated fields. Von Heuglin, on the other hand, states that its food appears to consist almost exclusively of leaves.

There is a photograph of a Gelada in Montagu (1951: 64), and a painting of it in *National Geographic* ([1938] 73: 645).

#### PROBLEMS: GENUS *Theropithecus*

The taxonomic affinities, geographical range, and fundamental ecology of this unique group remain uncertain. The fact that it is confined to a single area and high altitudes suggests that it occupies a refuge habitat. Perhaps it is only able to survive competition with baboons in Ethiopia. There are nineteenth-century accounts of battles between troops of Geladas and Hamadryas Baboons, some of them probably fanciful, however.

#### FAMILY COLOBIDAE

The family Colobidae is composed of the leaf-eating guereza monkeys. Here, the classification of the African Colobidae of Pocock (1935) is used, rather than that of Allen (1939) who followed Schwarz (1928c, 1929). For the Colobidae that are black and white, the classification of Schouteden (1947) is followed. The entirely black *Colobus satanas* is tentatively regarded as a separate species.

#### GENUS *Procolobus*

1. *Procolobus verus*. Olive Colobus, or Olive Guereza. The Olive Colobus is found in the coastal forest of the far west of Africa. Its range appears to be from Sierra Leone, about 10° N 13° W (Hill 1952), to the other extreme of this forested region at the eastern edge of Ghana, about 7° N 1° E (Booth 1956b). Rosevear (1953) does not report it in Nigeria.

Booth has provided the first detailed information on the ecology of the Olive Colobus. It is a forest form, which ranges into the fringing bushy forest. It is found

in the thick lower layers of the trees in the mature forest. It tends to be concentrated around swamps and river banks. It is extremely shy, and will not leave the low-level thickets, even in areas where *Colobus abyssinicus* and *P. badius* are not found. This habit undoubtedly has led to the erroneous belief that it is extremely rare. Its diet is normally exclusively leaves. In examining the stomachs of 41 Black, 33 Red, and 17 Olive Colobus monkeys, Booth found no fragments identifiable as fruit or animal matter.

Aside from a sketch of the head of the Olive Colobus in Hill (1952), the only illustration I have been able to refer to is a colored drawing in *P. Z. S.* (1868: 180). A note in Hayman (1935) points out, however, that nothing in the explanation of the *P. Z. S.* plate shows that the monkey behind the one labeled *Colobus kirki* is in fact *P. verus*. Hayman also states that the coloring is inaccurate on the frontal band, whiskers, and feet of the latter, and makes the corrections.

2. *Procolobus badius*. Red Colobus, or Brown Colobus. The Red Colobus is distributed very widely in forested parts of Africa, from Gambia, about 13° N 17° W, to Zanzibar Island, about 6° S 39° E. However, there are great gaps in this distribution in East Africa, where it is reported from only three localities east of Lake Victoria: Zanzibar, the mouth of the Tana River at about 7° N 40° E, and the Uzungwe (Udzungwa) Mountains of Tanganyika at about 8° S 36° E. Its distribution in the great forests of western Africa and the Congo appears generally to be fairly continuous, and yet it is rare or absent in many particular localities. It is found in gallery forests north of the Congo rain forest (Schouteden 1947), and in a few outlying forests in the southeastern Congo, Ruanda-Urundi, extreme north-west Tanganyika, and western Uganda. One or two of these may be montane forests, although earlier reports of a form of Red Colobus in the forest of Mount Ruwenzori are not supported by Haddow *et al.* (1951) and are specifically refuted for the Congo side of the mountain by Schouteden.

Extensive local geographical differences in pelage have led to the naming of numerous subspecies of *P. badius*. Some of these are highly variable in appearance of the coat, while others are quite uniform, according to Malbrant and Maclatchy (1949). Schouteden (1947) suggests that one of these named subspecies, *P. badius Tholloni*, may, on the basis of its appearance, actually be specifically differentiated. His distribution map shows a certain amount of overlap of this form with two neighboring subspecies, but the number of collecting localities is small, and no field work has been done to test the possibility.

According to Booth (1956b), the Red Colobus occupies the highest levels of the trees in the mature forests of the Gold Coast. It is versatile in occupying different forest sub-types, ranging from very moist regions to forests with distinct dry seasons and many deciduous tree species; yet it occupies only forests in the western part of the country. It is the most unwary of the monkeys in Ghana. This appears to be the case also in the Congo and Uganda forms that I have observed, which suggests that they may make excellent subjects for ecological and social studies. Furthermore, according to Malbrant and Maclatchy (1949), the territorial range of single

bands is severely restricted. These authors state that bands seek out the heavily forested regions that border rivers.

Booth (1956b) reports that only leaves were identified in the stomach of Gold Coast Red Colobus Monkeys. Malbrant and Maclatchy report nothing about the diet of these monkeys in French Equatorial Africa.

A photograph of a Red Colobus Monkey is in Allen (1925). Colored drawings of local variants are in *P. Z. S.* (1868: 180 [foreground figure]; 1935: 915).

#### PROBLEMS: GENUS *Procolobus*

The historical causes for the distributional peculiarities of representatives of *Procolobus* are of considerable interest. While *P. badius* ranges across the entire continent, even though very spottily in East Africa, *P. verus* has not been reported east of the Dahomey Gap. Within its range, however, the Olive Colobus Monkey is probably not nearly so rare as was formerly supposed, and it extends to the eastern edge of the western forest. It may therefore be questionable to suppose that it is an ancient, "primitive" form surviving only in a refuge area.

On the other hand, the Red Colobus representatives east of the Congo Basin appear to be only remnants of what must have been a wide and continuous distribution at one time. While Red Colobus is very abundant in the Ituri forest at the eastern edge of the Congo Basin (Hayman, personal communication), it is rare in the Kibale forest of western Uganda, and is not found farther east until the coast is reached. The Tana River and Zanzibar forms are found in forests that apparently are largely swampy in nature. No Black and White Colobus Monkeys have been reported from these forests, but they are abundant in many other parts of East Africa. This indicates that other elements probably enter into the simple arboreal stratification Booth (1956b) observed for the three Colobus forms in Ghana. It appears possible that the Black and White Colobus has tended to eliminate the Red Colobus in much of East Africa, or that the latter species can survive only in rather special circumstances.

In French Equatorial Africa, Malbrant and Maclatchy (1949) give evidence that the distributions of the two genera are not independent of one another. They observe that the Red Colobus is found on one side of a river, and the Black and White Colobus on the other, in several rivers of the Middle Congo District, such as the Alima, Sangha, and Likoula, all tributaries of the Congo.

It is evident that the areas of ecological competition and diversification of the Red Colobus, Olive Colobus, and Black and White forms need to be explored more thoroughly, and over a wider range of territory.

#### GENUS *Colobus*. BLACK AND WHITE COLOBUS MONKEYS, BLACK AND WHITE GUEREZAS

Schwarz (1929) includes all these monkeys in a single species, subdivided into four named sections. Since his own distribution maps and discussion show that in two extensive areas there is overlap without hybridization of the differentiated forms, there must be at least two species of Black and White Colobus. I have observed the two species of Colobus within a mile of each other in the western part of the forest of the Congo Basin.

The two species names listed by Schouteden (1947) from the Belgian Congo and Ruanda-Urundi are used here (*Colobus abyssinicus* and *C. polykomos*). However, it is difficult to determine the relationships of further differentiated and isolated forms from the remainder of the continent. Schwarz (1929) describes well a number of these variants, some of which were emphasized and illustrated by Lydekker (1905).

1. *C. abyssinicus* is found in many isolated forests in East Africa, the northern part of Ruanda-Urundi, and in the northeastern part of the Congo forest. It is found also along the Ubangi River, a Congo tributary north of the rain-forest zone, and ranges into the Middle Congo and northeastern Gaboon areas of French Equatorial Africa. Its western limit in Gaboon is the Voung (Mvoug) River, and its southern limit is the Ivindo, which join at about 12° E near the equator. It is found in Cameroons (Rode 1937) and in the extreme southeastern part of Nigeria (Rosevear 1953).

Eastward, *C. abyssinicus* is found in many forested regions in Uganda, Kenya, and Ethiopia (Schwarz 1929). It has representatives in nearly every extensive mountain forest, including the great volcanic peaks of Mount Elgon, Kenya, and Kilimanjaro. It is also possible that all the forms of Black and White Colobus in Tanganyika will eventually be included with *C. abyssinicus* rather than *C. polykomos* (see below).

There appears to be only one form of Black and White Colobus in any one locality of the western coastal forest. This is the *polykomos* section of Schwarz (1929). These forms seem to resemble *C. abyssinicus* more closely than Schouteden's (1947) *polykomos*. They range from Sierra Leone (Schwarz 1929) to western Nigeria (Rosevear 1953). These western forms may also come to be included in the species *C. abyssinicus*. Booth (1954a) has shown that two of the named subspecies hybridize at the boundary of their ranges on the Ivory Coast, about 5° W, indicating the conspecificity of several of the western forms.

In Ghana, Booth (1956b) reports only leaves in the stomachs of Black and White Colobus Monkeys. Malbrant and Maclatchy (1949), however, state that these monkeys follow the seasonal ripening of certain fruits, an indication that this form may be partly frugivorous. The latter authors do not report stomach contents, however, as they do in the case of *C. satanas*. Jeannin (1936) also reports a diet of seeds and fruits for this form.

Booth reports that this form of Colobus Monkey occupies the middle layers of the forest in West Africa, but moves into the highest layers as well if the Red Colobus is absent, and will invade low thickets. It ranges widely, being found in fringing forest and gallery forest as well as in rain forest. In Uganda, its absence from a number of the lowland outlying forests may be related to the vigor with which it has in the past been hunted for its pelt and meat. Now protected, it is common in numerous localities. It is usually assumed that it is primarily a leaf eater. Haddow *et al.* (1951) classify it as exclusively arboreal, but some reports of crop raids have been noted by local residents, and Lumsden and Buxton (1951) repeatedly observed it on rocky outcrops in West Nile District, Uganda, where it apparently travels between patches of gallery forest.

According to Haddow (1952), the Uganda representa-

tive of this species is often present in swamp forests and second-growth areas, but it prefers the interior of large, mature blocks of forest.

A photograph of *C. abyssinicus* is in Sanderson (1957: 111). Drawings of variant local coat patterns are in Lydekker (1905).

2. *Colobus polykomos* (*C. angolensis*) ranges from Angola through much of the great Congo forest, and in forest outliers in the savanna region south of the forest. It is also to be found in mountain forests in the eastern part of Belgian Congo, Ruanda-Urundi, and on Mount Ruwenzori, which separates Uganda and Belgian Congo at about 1° N 30° E. Its northern limit is the edge of the Congo forest, about 3° N, and its eastern extremity in that area is west of Lake Albert, about 2° N 31° E (Schouteden 1947). It has been reported from the Middle Congo District of French Equatorial Africa, but Malbrant and Maclatchy (1949) were not able to give positive confirmation of its presence there. It is found in mountain forests between the southern end of Lake Tanganyika and the northern end of Lake Nyasa to the east coast, and is reported also from coastal and mountain forests of northeastern Tanganyika and southeastern Kenya.

The Colobus Monkeys that I have observed in this latter area resemble *C. abyssinicus* much more closely than *C. polykomos*. This is also indicated in Schwarz's (1929) descriptions of the pelts of the eastern forms of his *angolensis* section, and actually recognized by him. His reasons for not including them in his *abyssinicus* section are not at all clear. It is thus entirely possible that all the Black and White Colobus Monkeys of East Africa will eventually be included with *C. abyssinicus*, when more is known of the relationships of the different populations.

No literature seems to be available on the adaptation of *C. polykomos*, beyond observations of its altitude range, which is extensive. It occupies both lowland and montane rain forests.

Photographs of *C. polykomos* are in Schouteden (1947). It is also illustrated in Lydekker (1905), by a line drawing.

3. *Colobus satanas*, the Black Colobus Monkey, does not extend east of the right bank of the Congo River. It ranges throughout the forested regions of the Middle Congo and Gaboon Districts of French Equatorial Africa and the southern part of Cameroons. Jeannin (1936) states that it is very rare in Cameroons, and that its northern limit is at Yoko, about 6° N 12° E. It is found on the island of Fernando Po, about 4° N 8° E, and in Spanish Guinea (Cabrera 1929). Rosevear (1953) does not report it from southeastern Nigeria, nor does Schouteden (1947) from the Belgian Congo.

Rode's (1937) inclusion of Sierra Leone in the range is not supported by Allen (1939), who lists exactly the same references as Rode. It seems probable that Rode is in error. Mackenzie (1952) reports only one form of Black and White Colobus Monkey in Sierra Leone.

The range of *C. satanas* overlaps that of *C. abyssinicus* extensively. The two must therefore be regarded as separate species, Schwarz (1929) to the contrary. Schwarz's map does, in fact, show an area of overlap of



the two forms in French Equatorial Africa, but that area must be extended considerably in the light of information in Malbrant and Maclatchy (1949). There remains the question of whether or not *C. satanas* is a local representative of *C. polykomos*.

According to Malbrant and Maclatchy (1949), *C. satanas* seems to be confined to rain forests, not being observed in gallery forests. It avoids human habitations. It is particularly abundant in mountain forests. It is narrowly restricted in territorial range of bands; there is evidence of seasonal localization in favorable areas. It usually occupies the highest levels of the trees. Certain types of seeds and fruits have been recovered from the stomachs of individuals fairly often, according to Malbrant and Maclatchy (1949), which picture contrasts with Booth's (1956b) record of nothing besides leaves for three species of Colobus monkeys in Ghana.

There is a drawing of *C. satanas* in Lydekker (1905). A photograph is in Malbrant and Maclatchy (1949: 24).

#### PROBLEMS: GENUS *Colobus*

The question of the degree of relationship among the different forms of Black, or Black and White, Colobus monkeys has already been mentioned. When more is known about the adaptations of various forms, it may be possible to untangle the taxonomy further. The areas in which *C. abyssinicus* overlaps the distribution of *C. polykomos* and *C. satanas* would seem to be critical for studies of their fundamental ecologies.

There are indications of arboreal stratification between *C. abyssinicus* and *C. satanas* in the discussion of Malbrant and Maclatchy (1949), although these authors do not specifically take up this question. The evidence they present for fruits and seeds in the diet of the latter species, and possibly of the former, adds a further dimension for investigation.

*C. polykomos* is found in mountain forests in Ruanda-Urundi and western Uganda where *C. Abyssinicus* is not, but *C. abyssinicus* is the sole representative of the genus in mountain forests farther east in Uganda and Kenya. This distributional peculiarity may be attributable simply to the fact that *C. polykomos* reached the mountain forests to the west first, since this region represents the northeastern limits of the range of the species. The mountain forests of Ruanda-Urundi, Mount Ruwenzori, Mount Elgon, Mount Kenya, and Mount Kilimanjaro have many similarities in fauna and flora; however, there may be crucial differences that allow the survival of one species and not of the other. Analysis of the area of overlap of the two species in the northeastern part of the Congo forest, with a view to ascertaining if one species is expanding into the range of the other, should be of considerable interest in the light of the problem outlined above.

Concerning problems of the spread of the different local forms of Red Colobus, and Black and White Colobus, it is difficult to place confidence in the migration routes postulated by Schwarz (1928c, 1929).

Finally, there would be great value in exploring the consequences for the Colobidae of their specialized diet of leaves. This basic adaptation may, beyond its biological consequences, have profound effects on social organization, relative numbers, territorial range, seasonal movements, and many other aspects of behavior.

## DISCUSSION

### I

#### ACCURACY AND COMPLETENESS OF AVAILABLE INFORMATION

A review article can be no more accurate or complete than its sources. This one has concentrated mainly on recent publications, and on those that have a basis in field experience. The present author has had no opportunity to search the numerous publications concerned with particular African areas, although there is almost certainly additional information on monkeys to be found in such sources. If readers are aware of other published information, I hope they will communicate with me or with a suitable journal, so that corrections and additions can be made.

In carrying on field work in Africa, I found that local officials and residents frequently know much more about the primates of their vicinity than can be found in the literature. It will be very helpful if field workers not primarily concerned with monkeys will give to interested specialists the names and addresses of any such local experts whom they may know. Some of the problems outlined in this article may be more fully defined, and even solved, by correspondence with such naturalists, or with the field workers themselves.

There are wide differences in the thoroughness of the work done by different authors. The studies made at the East Africa Virus Research Institute (e.g., Haddow 1945, 1952, 1956; Haddow *et al.* 1947, 1951; Buxton 1951, 1952; Lumsden 1951; Lumsden and Buxton 1951) exemplify how much can be learned when able workers have adequate resources. However, the Institute concentrates mainly on the few species most probably implicated in spreading diseases to human beings. In West Africa, the studies of Booth (1954a, 1955, 1956a, 1956b), while much less complete, demonstrate the value of a resourceful individual worker who concentrates on primates. Booth's untimely death was a catastrophe. Other authors have spread their attention over numerous animal groups, and their accounts of the distribution and ecology of monkeys tend to be limited. Of these, Schouteden (1947) and Malbrant and Maclatchy (1949) are probably the most reliable and thorough. Even such meticulous authors as these, however, are to a considerable extent dependent upon the reports of other workers. It seems likely that more intensive observation and collecting will reveal many more localities for a number of species. This probability is enhanced by the experience of Haddow *et al.* (1947) in the Bwamba Forest, where a number of the species collected were rare, restricted in their local distribution, and difficult to observe.

For many species, the few words on adaptation in this review represent all that could be learned from available publications. Most of the effort culminating in publication has been taxonomic in orientation, and most frequently based upon museum collections. Since locality is important in research on adaptation, the broad outlines of the distribution of African monkeys are generally clear in the literature. As has been emphasized, however, there are many uncertainties of detail, and, certainly, there are many errors and discrepancies in the literature, as Moreau, Hopkins, and Hayman



(1946) have shown. The present article has followed those authors whose information seemed most reliable, rather than listing and discussing all reported localities and species.

## II

### GENERAL PROBLEMS OF ECOLOGICAL ANALYSIS OF AFRICAN MONKEYS

#### A. GEOGRAPHICAL AND VEGETATIONAL LOCATION OF SPECIES

The following is an attempt to group by geographical vegetational areas the African monkey species, or species groups, south of the Sahara.

1. Continental distribution outside forest zone: *Papio* species, *Cercopithecus aethiops*. (2)
2. Continental distribution north and east of equatorial forest zone, but not south of it: *Erythrocebus patas*. (1)
3. Scattered distribution in rain forests and perhaps wooded savanna of eastern and southern Africa: *Cercopithecus mitis* group. (1)
4. Lowland forest west of Dahomey Gap only: *Procolobus verus*, *Cercocebus atys*, *Cercopithecus diana* (?). (2 or 3)
5. Lowland forest both west and east of Dahomey Gap: *Cercopithecus diana* (?), *Cercopithecus cephus* group, *Cercopithecus mona* group, *Cercopithecus nictitans*, *Colobus abyssinicus*, *Procolobus badius*. (5 or 6)
6. Forest east of Dahomey Gap only: *Allenopithecus nigroviridis*, *Cercocebus torquatus*, *Cercopithecus erythrogaster*, *Cercopithecus preussi* (?), *Cercopithecus pogonias* (?), *Cercopithecus talapoin* (?), *Cercopithecus dryas* (?), *Cercopithecus hamlyni*, *Mandrillus leucophaeus*, *Mandrillus sphinx*, *Colobus satanas*. (Between 7 and 11)
7. Forest east of Dahomey Gap and outlying forests east of the Congo Basin: *Cercocebus albigena* group, *Cercocebus galeritus*, *Cercopithecus cephus* group, *Cercopithecus mitis*, *Cercopithecus neglectus*, *Cercopithecus phoesti* (?), *Cercopithecus talapoin* (?), *Colobus abyssinicus*, *Colobus polykomos*, *Procolobus badius*, *Papio doguera*. (Between 9 and 11)
8. Ethiopian highlands only: *Theropithecus gelada*. (1)

The species tagged with a question mark either are reported with questionable validity so that some of their localities are uncertain, such as *C. diana* and *C. talapoin*, or may have virtually identical relatives in other localities with different species names, such as *C. diana* and *C. dryas*, or *C. phoesti* and *C. preussi*. The relationship of *Cercopithecus pogonias* to the *C. mona* group is in dispute, so it too is marked questionable.

It may be reasonable to place *Cercocebus atys* and *C. galeritus* together in one species group and extend the range of the group, in a manner similar to the *C. cephus* group. However, the two forms are separated by a distance of approximately 1,000 miles, noticeable physical distinctions, and by *C. torquatus*.

There appears, from available evidence, to be no clear division on the basis of adaptation to montane or lowland forest. The following species have been reliably reported from altitudes high enough for montane forests: *Cercopithecus phoesti*, *Cercopithecus mitis*, *Colobus abyssinicus*, *Colobus polykomos*, and *Procolobus badius*. Each of these species also has representatives in lowland forest. Sanderson (1940) reports that *Cercopithecus pogonias* and *Cercopithecus preussi* are found in mountain forests in Nigerian Cameroons, but

the highest altitude he mentions for these species is 4,000 feet. It is therefore not established that they are found at the level of true montane evergreen forest. The altitudes at which *Cercopithecus neglectus* is found in mountain forests in northern Uganda are not established in the literature, but stated localities of collection appear to be below the general level of true montane forest. *Papio doguera* is found at very high altitudes in East Africa, but it is not certain, from descriptions I have been able to obtain, that baboons have been reported from evergreen montane forests. The description in the *Tanganyika Game Department Annual Report* (1953) does not specify the altitudes of the climax rain forests which baboons are reported to occupy. Atop Mount Napak, in northern Uganda, the rainy season is apparently too brief to support closed forest of the high-altitude type. *Cercopithecus ascanius* of the *C. cephus* group has an upper altitude range of between 5,000 and 6,000 feet in Uganda, and is reported from a western Kenya locality of 6,500 feet (Haddow 1952). It thus seems to be able to obtain a foothold at lower levels of montane forest, but it is nevertheless characteristically a lowland forest species.

All the other forest monkey species appear to be confined to lowland forest. This category includes all species of the genera *Cercocebus* and *Mandrillus*, the single-species genus *Allenopithecus*, and the large majority of the representatives of *Cercopithecus* and *Procolobus*.

Only the single-species genus *Theropithecus*, the Gelada, is absolutely confined to high altitudes. It is apparently not a forest form, however. It lives primarily in rocky country, if the sketchy accounts available to me are accurate.

In the ensuing discussion, the forest block west of the Dahomey Gap is referred to as the Guinea Forest, while the great forest to the east of the gap is the Congo Forest. This is the terminology of Dekeyser (1955).

Of the species in the Congo Forest, only a few are found throughout the greater part of its extent. These are the *Cercopithecus cephus* group, the *Cercopithecus mona* group, and *Procolobus badius*. Even in these cases, there are distinct species of the two *Cercopithecus* species groups within the forest, and the possibility of more than one species of Red Colobus. It is worth noting that all three groups are also found west of the Dahomey Gap. *Cercocebus albigena* and its closely allied species are also very widespread, but do not extend as far west as Nigeria. The remaining species of this forest zone have restricted ranges. *Cercocebus torquatus*, *Cercopithecus erythrogaster*, *Cercopithecus preussi*, *Mandrillus leucophaeus*, *Mandrillus sphinx*, and *Colobus satanas* are all west of the Belgian Congo. This would be the case also with *Cercopithecus diana*, in the rather unlikely event that this species should be found east of the Dahomey Gap at all. For all effective purposes it is probably true for *Cercopithecus talapoin*, even if a relict population on the Ruwenzori Mountains is later confirmed. *Allenopithecus nigroviridis* is confined to the area around the southward bend of the Congo River. *Cercopithecus neglectus* is not found in Nigeria, nor in the southeastern part of the forest, and

its distribution appears to be erratic in many other areas within the forest. *Cercopithecus nictitans* does not extend beyond the right bank of the Congo River, being thus confined to the western and northern parts of the Congo Forest and outliers. *Cercopithecus mitis* is much more common in the eastern part of the forest, and does not extend west of the southward bend of the Ubangi River. *Cercocebus galeritus* is found in the northern part, and is reported from a few places along one southern tributary of the Congo. *Cercopithecus dryas*, *Cercopithecus lhoesti*, and *Cercopithecus hamlyni* are confined to the eastern part of the forest.

It therefore appears that there are strong factors producing speciation among the forest monkeys. The tendency toward genetic divergence is evident in the number of divergent populations that are recognizable at a subspecies level (Schouteden 1947; Malbrant and Maclatchy 1949). The process is evident, in spite of the relative vegetational uniformity observed for widely separated parts of this great tract of forest (Richards 1939; Eggeling 1947), and regardless of Rosevear's (1953) statement that the mammals of the Nigerian forest seem to ignore the different floristic zones and spread through most of its extent.

This trend toward genetic divergence of populations of monkeys has also been taking place in the Guinea Forest, as Booth (1954a, 1955, 1956a) has demonstrated. The process does not seem to have developed as far as in the much larger forest area to the east, however. There are only two or three species peculiar to the area, while the Congo Forest has between seven and eleven autochthonous species, and six more species shared with forests to the east of its boundaries, for which there are no equivalents in the Guinea Forest. This tally does not include *Papio doguera*, which is usually regarded as a savanna form, but is found deep within the forest in Belgian Congo.

The monkey species adapted to savanna country do not exhibit the same amount of divergence as do forest forms. Many subspecies of *Cercopithecus aethiops* have been described, but their conspecificity is acknowledged by most authors. The extent of divergence of the subspecies does not appear to be great, and in many cases probably rests upon individual variations. Only two, or possibly three, subspecies of *Erythrocebus patas* are recorded. The species of *Papio* may actually be locally variant populations (Ellerman, Morrison-Scott, and Hayman 1953).

It appears that the forest zone has more effective isolating mechanisms for monkeys than does savanna country. Rivers provide one means of isolation, but they do not seem to be an adequate explanation for many of the peculiarities of distribution. A much closer look at the relationships of the different monkey species to their forest habitats, to other animal species, and to each other is needed. Students of primates have barely begun this kind of work.

#### B. INTERRELATIONSHIPS OF MONKEY SPECIES

Much of this review has been taken up with information on the kind of environment favored by the various African monkey species. In only a few cases has published ecological analysis of the interrelationships of different species within the same territory been men-

tioned. Booth (1955, 1956b) alone has undertaken this kind of study systematically, although there are numerous observations of a similar nature in the studies of Haddow (1952) and of other workers at the East Africa Virus Research Institute. Booth's work on synecology is to a considerable extent preliminary in nature because of his limited resources, but it shows clearly that there is a bright future in this kind of investigation.

The territorial interrelationships of the savanna forms *Cercopithecus aethiops*, *Papio* species, and *Erythrocebus patas*, have been described under "Problems" concerning the last species. Booth's (1956b) findings on the arboreal stratification of the leaf-eating Colobus monkeys in Ghana places the Red Colobus in the upper layers, the Black and White Colobus in the middle layers, and the Olive Colobus in the lowest. These differences are accompanied by behavioral characteristics that tend to explain the wide spread of *C. abyssinicus* compared with the other two species within that country, and perhaps through much of Africa.

A similar stratification was found among fruit-eating monkeys. The Diana Monkey occupies the upper and middle layers; the Mona Monkey, the middle and lower layers; and the White-Crowned Mangabey or Sooty Mangabey, the lower and ground layers.

The Spot-Nosed Monkey (*Cercopithecus petaurista* of the *C. cephus* group), which eats both fruit and leaves, competes with the leaf-eating and fruit-eating monkeys of the middle and lower layers.

In forest fringes and forest outliers, Booth found some overlap between the Green Monkey (*Cercopithecus aethiops*), on the one hand, and the Mona and Spot-Nosed monkeys, on the other. Where fringing forest is occupied by one or both of the last two species, the Green Monkey remains on the edge. If no other monkeys are present, the Green Monkey ranges throughout the forest.

It should not be concluded that the adaptations of different monkeys are always easily distinguishable. Haddow (1952), Malbrant and Maclatchy (1949), and Booth (1956b) recorded different species taking identical food together at the same spot, which shows that there is ecological overlap among numerous species of African monkeys (see also Imanishi [2]☆). Both Haddow, and Malbrant and Maclatchy, indicate that this is often a seasonal phenomenon. In general, there has been little systematic study of the several aspects of the environments exploited by species with considerable ecological overlap. Such work should be especially valuable in finding out the causes of population limitation, the geographical range of different species, and the spotty distribution observed for a number of forest species.

One method of studying environmental exploitation is accurately to map the location of the different species within segments of the forest. So far as can be determined, only Haddow *et al.* (1947) have attempted this, in the Bwamba lowland forest of western Uganda. By systematically observing and hunting through the area, these authors were able to obtain an accurate idea of the local ranges of different species. The extent to which these findings might be altered by seasonal considerations is not clear. A relative abundance of monkeys of different species seems established, however. It was only

after intensive hunting that some species were discovered at all, while others were found to be numerous.

Such observations of relative abundance represent a very significant key to analysis of basic ecologies, and probably in many areas, to problems of presence or absence of species. For example, Haddow (1952, 1956) observes that the Red-Tail Monkey (*Cercopithecus ascanius*) tends to be abundant in the forests along the north and northwest shores of Lake Victoria, while the Black Mangabey (*Cercocebus albigena*) is not so common. In the forests farther south along the western shore of Lake Victoria, *C. ascanius* is relatively rare, while the dominant species are *C. albigena* and a subspecies of *Cercopithecus mitis*. The difference may be correlated with the greater swampiness of the more southerly forests, but the operative factors have yet to be investigated.

My own observations lead me to believe that local species dominance is very common among monkeys in Africa. Local study of factors behind such dominance should contribute to an understanding of the fundamental ecologies of monkeys, and should afford clues to the many problems of absolute presence or absence. Where many species are competing, it might result in determination of basic, minimal adaptation; in other localities, the factors enabling a monkey to exploit new aspects of the environment, when a potential competitor is absent, may be readily analyzed. Booth's (1956b) pioneering observations of such situations show the value of this approach.

The smaller forests lying outside the great forest zones should be useful in many studies of monkey adaptation. Their relatively small total area and more limited monkey fauna help to define and delimit problems for study. In Uganda, a groundwork for such projects has been laid by the workers at the East Africa Virus Research Institute. Haddow *et al.* (1951) have provided reliable, though of necessity incomplete, records of primate species present in 41 localities, including 13 large forests and numerous areas in savanna country which contain smaller patches of forest. The number of species varies from ten in the Bwamba Forest to one in many of the other localities. The monkey fauna differs surprisingly in many places, so that a wide variety of species interrelationships is revealed. Exemplifying this are the Kibale and Itwara forests of western Uganda. Although the two are similar in type and structure, and are separated by less than ten miles of open country, the Itwara forest has three species, while the Kibale forest has six, including the three species found in the Itwara forest (Haddow *et al.* 1951).

Numerous problems of presence and absence are implicit in the variety of species occupying other outlying forests. There are also in this area a number of examples of apparent species dominance within single forests, as well as in the forests along the northern and western shores of Lake Victoria mentioned previously.

The ecology of a monkey species can be well analyzed in situations where the species is present in various forests, some of which contain other species, and others of which do not. Relevant differences in flora and non-primate fauna, altitude, and so on can be studied at the same time. The recent development of guns shooting drug-injecting darts may now make it feasible to cap-

ture fairly large numbers of arboreal monkeys economically, and to introduce them into forests where they did not previously exist, to try to test whether the local conditions that led to presence or absence of particular species, or to the dominance of one or a few, are still in operation. This is of great importance in connection with the effects the history of the monkeys has had on their present distribution, and there is abundant evidence that this history of climatic changes and species interactions is a very complex one.

There can be little doubt that the process of expansion and contraction of different species is continuing. Study of these ongoing changes will be essential to a full understanding of adaptations, to an analysis of past changes and present distribution, and to predictions for the future.

#### C. RELATIONSHIP OF MONKEY SPECIES TO OTHER ANIMALS

Little has been said above about the ecological relationships of African monkeys to other primates and to non-primate animals. It was only specified which species raid the gardens of man or make insects a part of their diet. Not much information is available along these lines, but there is enough to suggest that the subject needs further investigation.

The prosimian primates of continental Africa, the Galagos and Slow Lorises (Family Lorisidae), are exclusively nocturnal, and apparently are primarily predators upon insects and other small animals. As Booth (1956b) observes, it is doubtful that there is appreciable competition between them and any monkeys. It does not seem probable that they have any other kind of close ecological relationship, except perhaps with the possibly nocturnal *Cercopithecus hamlyni*.

The African anthropoid apes, the gorilla and chimpanzee, are diurnal animals which probably compete with forest monkeys for food. In several places in eastern Belgian Congo, the gorilla may be partial competition with *Cercopithecus phoesti*, which is found in both lowland and montane forests and spends a good part of its time on the ground. The chimpanzee is very widespread in forests both west and east of the Dahomey Gap, and also may compete with monkeys which spend some of the time on the ground or in lower levels of the trees. Haddow (1952) states that chimpanzees never seem to be part of mixed feeding parties with monkeys, but reports the visit of a band to a fruiting fig tree that had also been a feeding-ground for three species of monkeys.

The primate *Homo sapiens* is the worst enemy of many monkey species. Numerous African tribes hunt monkeys for their meat or pelts, or to preclude inroads on their crops. The Black and White Colobus Monkey was the object of a large fur trade in the past, in which "the beautiful skins of many of the species form a considerable article of commerce in Europe and America to adorn the costumes of the most refined and cultivated ladies, who vie for their possession with the semi-nude and barbarous warriors of Equatorial Africa, by whom they are also used as ornaments for their persons and for decorations for their weapons" (Forbes 1897). In some localities, species are in danger of extinction



because mature forest is being cut down for timber and to make gardens. On the other hand, unrestrained shooting of leopards has led to a great expansion of the baboon population in many parts of Africa (*Tanganyika Game Department Annual Report 1953; Uganda Game Department Annual Report 1955*), and a consequent increase of crop raids by the baboons has made them a major economic menace in numerous localities.

Another ecological relationship between African monkeys and man is the communication of disease. It is because monkeys serve as hosts for microbes which infect man that the thorough studies at the East Africa Virus Research Institute were undertaken. As a result of the work of Haddow *et al.* (1951), *Cercopithecus ascanius* was implicated as the animal most probably involved in the human yellow-fever cycle, with two species of mosquitoes as vectors. These studies yielded the material for Haddow's (1952) monograph on this species, the most complete work on any primate in its natural habitat.

Haddow (1952) provides an extensive list of other parasites of *C. ascanius*. Dekeyser (1955) gives lists of parasites of many species of monkeys in the French territories of Africa. The systematic study of parasites and their relationship to monkey hosts should reveal a great deal about the ecology of monkeys, and may be of real assistance in problems of taxonomy and primate evolution.

Aside from man, the tree-dwelling monkeys appear to have only one other important predator, the Monkey-Eating Eagle (*Stephanoaëtus coronatus*), which has a trans-African distribution (Haddow 1952). It is probable that a number of other bird species are symbiotic or competitive with monkeys. According to Good (1952), the Congo White-Crested Hornbill (*Tropicranus albo-cristatus cassini*) of southern Cameroons is observed most often in association with feeding arboreal monkeys, usually just below them. They feed either on the fruits the monkeys find, or, more likely, on the insects they disturb. Malbrant and Maclatchy (1949) report similar observations on this bird in French Equatorial Africa.

Haddow (1952) contributes an account of a single fruiting tree being visited by chimpanzees, three species of monkeys, two species of squirrels, and ten species of birds in one afternoon, and by two species of birds and by fruit-eating bats in the evening. This was an unusual aggregation, however, occasioned by the infrequent and short-lived fruiting period of the tree. The extent and nature of day-to-day competition of monkeys with other forest-dwelling animals remains to be studied.

#### D. AFRICAN FLORA AND MONKEY SPECIES

The classification of vegetational zones given in the introduction to this article is a very general guide to the location and adaptation of African monkeys, and available detail on the kind of country in which given species are most often found has also been summarized. In most cases, information is inadequate for more than a very general idea of the ecology of the species, and it repeatedly raises problems of the kind brought out in this review. Plants provide the largest proportion of food for all species for which there is good information

on diet, but exhaustive breakdowns of the variety and seasonal changes of diet have not been made. The most extensive catalog is that of Haddow (1952) on the Red-Tail Monkey, *Cercopithecus ascanius*, but he also explains the many difficulties in making an accurate analysis of diet. He does give an idea of the great variety of plant species used for food by this representative of the *C. cephus* group, however, and thereby reveals one reason for the wide geographical range and large populations of this adaptable monkey.

Further analysis of the vegetation of Africa in relation to the ecology of monkey species is necessary, if the problems of distribution and adaptation presented in this article are to be solved. Fortunately, the study of many aspects of forest and savanna ecology is being vigorously extended, especially by local governmental scientific institutes. Their findings are certain to be relevant to problems concerning primates, but cannot be a substitute for studies upon the monkeys themselves. It is the task of investigators concerned principally with primates to make the necessary correlations.

### III

#### AFRICAN MONKEYS AND ANTHROPOLOGICAL PROBLEMS

##### A. THE EVOLUTION OF AFRICAN MONKEYS AND THE CLIMATIC AND FAUNAL HISTORY OF THE CONTINENT

The frequently discontinuous distribution of monkey species in Africa indicates that they spread continuously to the maximum limits of their present ranges when ecological conditions were favorable, and subsequently became extinct in the territories now unoccupied, as climate changed. This interpretation accords with the findings of ornithologists and botanists in Africa, most spectacularly exemplified by Chapin's (1923, 1932) observations of the very close similarities between high-altitude bird and plant communities on the widely separated peaks of Fernando Po and Mount Cameroun in West Africa, and on the great mountains in eastern Congo, Uganda, Kenya, and Tanganyika. The situation appears to be considerably more complex in the case of the monkeys, however, since, while the birds are everywhere accompanied by virtually identical faunal complexes, there is typically a lack of close correspondence in the localities of one species of monkey with the spots in which another is found.

The extinction of monkeys in the territories between isolated remnant populations is in some cases largely the result of the destruction of forest. This is shown vividly by the *Cercocebus galeatus* inhabitants of a single coastal forest in Kenya, but is true in less extreme degree of numerous other forest species. Apparently, groups of *Papio* and *Erythrocebus* (Dekeyser 1950) isolated in mountainous areas in the Sahara also indicate a previously greater northerly extension of savanna country from the south. In other instances, species appear to have died out locally because forest conditions become unsuitable, or because of competition from other animals. This is borne out by the limitation of some species to a single part of the Congo Forest, by the gaps in distribution of other monkeys within that large area, and by the differences in species inhabiting neighboring smaller forests outside the main forest zone.



It is clear that the distribution patterns of African monkeys are not likely to afford a precise key to the faunal history of the continent. Nevertheless, certain features of the patterns deserve comment for their possible relevance to theories of the taxonomy and of the dispersal of various monkey groups. In the ensuing discussion, a number of hypotheses are offered for examination.

The two great families of monkeys, the Colobidae (Semnopithecidae) and Cercopithecidae, are both represented in Asia as well as in Africa. This implies that satisfactory ecological conditions for interchange of monkey populations between the two continents have existed since the monkeys as a group evolved. Further, the presence of the leaf-eating Colobidae in both areas strongly indicates that rain-forest or gallery-forest conditions at some time prevailed in intervening territory. Moreau (1952) has shown, on the basis of floristic and avifaunal data, that forest-zone interchange was unlikely for any long period of time, or, since the affinities are mainly at the familial and ordinal levels, at any time more recent than the early Pliocene. According to Moreau, the geological evidence suggests that Africa was isolated from the rest of the world during the greater part of the Tertiary. While it is recognized that the comparability of higher taxonomic categories is difficult to evaluate, the monkey data seem to be in close agreement with this view. Relationships with Asiatic forms are at the family, or subfamily, level, in the view of Simpson (1945). With the exception of *Macaca sylvanus* from the Mediterranean zone, none of the Asiatic genera is found in Africa. Paleontological evidence indicates that *Macaca sylvanus* reached northern Africa by way of Europe, and its range overlaps that of no other African monkey. Thus a characteristic monkey fauna has evolved in Africa, probably free of significant external invasions in later Tertiary times.

This line of reasoning seems to apply equally to the African anthropoid apes. Their relationship to Asiatic forms is above the generic level. The anthropoid condition seems to have been attained before the separation of Asiatic and African forests, if the forest adaptation of existing apes is an indicator of the past, and if the possibility of independent attainment of the anthropoid status is ruled out.

The present paper's discussion of African monkeys according to ten genera may have tended to obscure the probability that groups of genera can be constructed on the basis of closer kinship. These probable relationships have been mentioned above, but the groupings have yet to be listed:

- (1) *Allenopithecus*, *Erythrocebus*, and *Cercopithecus*
- (2) *Papio* and *Mandrillus*
- (3) *Cercocebus*
- (4) *Macaca*
- (5) *Theropithecus*
- (6) *Procolobus* and *Colobus*

Group 1 corresponds to Sanderson's (1957) Cercopithecoids. He places groups 2, 3, 4, and 5 among the Cynopithecoids, which include Asiatic genera. The listing of *Theropithecus*, the Gelada, with baboons, macaques, and mangabeys is in disagreement with Forbes (1896), who states that its affinities are with the guenons. Within the genus *Cercopithecus*, *C. talapoin* and *C.*

*hamlyni* are sufficiently distinct to prompt some authors to place them in separate genera. On the other hand, the separation of the Colobus monkeys into two genera is not universally accepted. They are much more similar to each other than to Asiatic Colobidae.

From the information given above, and from the extensive list of species groups and species of guenons, it seems evident that there has been a greater amount of differentiation within *Cercopithecus* and its related genera than within any other monkey group in Africa. At the same time, no Asiatic genera are considered to be closely related to the Cercopithecoids. There is therefore reason to believe that they represent a distinctive African evolution, and that their ancestors were on the continent before those of any other monkey group now represented. The relative poverty of forms of both Cynopithecoids and Colobidae in Africa, which contrasts not only with the variety of Cercopithecoids in Africa but also with the considerable differentiation among Asiatic representatives of the first two groups, suggests that they invaded Africa after primary evolution elsewhere.

Pilgrim (1915) tentatively identifies a few fossil teeth from the Pliocene of India as being from a species of *Cercopithecus*, but Matthew (1929) states that they are from a macaque. Solution to the question of a past non-African range for *Cercopithecus* must await more evidence.

It may be argued that African forest monkeys are basically lowland forest forms, and that those monkeys found in montane forests invaded them secondarily. The vast majority of forest monkeys are confined to lowland forests; those few species found in montane forests are also represented in lowland forests. According to Moreau's (1952) information, the flora of lowland and highland African forests are so basically different that they must have been evolving independently since very ancient times. In numerous areas on the slopes of mountains, the two types of forest overlap, however.

Of the savanna-adapted forms, the close similarity of *Erythrocebus* to *Cercopithecus* in basic structure indicates its African forest derivation. The peculiar distribution of *Erythrocebus* has been discussed; the problem is at present so far from solution that its historical and evolutionary significance is obscure. *Cercopithecus aethiops* represents a transitional status between forest and savanna adaptation, which indicates how *Erythrocebus* may have evolved. The baboons, *Papio* and *Mandrillus*, may, on the other hand, have adapted to open country and in places re-invaded the forests. Where *Papio* is found in forests, it seems to carry on much of its activity on the ground. *Mandrillus*, while exclusively forest-dwelling, also appears to be adapted primarily to life on the forest floor.

Aside from the uniquely localized Barbary Apes of North Africa, baboons are the only African monkeys found outside the continent.<sup>4</sup> In addition to their present distribution in Arabia, Pleistocene baboons have been recovered from India (Simpson 1945). The problem of their origin is closely tied in with that of their genetic relationship to macaques, mangabeys, and the Gelada.

The extent of the spread of several African monkeys is a possible indicator of evolutionary and historical sequences in Africa. Of the forest monkeys, the *Cercopithecus mitis* group alone is found widespread in the southern part of the continent, and its localities are predominantly in eastern Africa. The possibility must be considered that it represents the most ancient group of monkeys on the continent, and that it reached its southern area of distribution before the differentiation of other species.

The problem of past boundaries of the African forest zone has been examined by Moreau (1952). Because of the relationship of African climate to world geographical conditions, and because of lack of affirmative geological evidence, he finds it difficult to believe that the broad forest belt ever extended the length of the continent. However, the present adaptation of numerous *C. mitis* populations to heavy forest in the southern part of the continent, and their considerable local differentiation, suggest that they are relics of an ancient spread of the forest. Moreover, although *C. mitis* is not found in the western part of the Congo Forest nor in the Guinea Forest, the distribution of *C. nictitans*, thought by some investigators to be its closest relative, begins approximately where that of *C. mitis* terminates, and continues in the western forests. If this is the case, representatives of this postulated ancient forest group retain a very wide distribution.

In addition to expressing discomfort concerning the spread of continuous rain-forest belt to the southern end of the continent, Moreau sees no geological evidence of direct Asiatic and African forest connections, but has been forced to assume them on the basis of floral relationships. On similar grounds, he finds it difficult to accept Chapin's (1932) explanation for the close similarities of widely scattered high-altitude flora and fauna—the simplest one of a very considerable lowering of temperatures on the continent—but is frankly unable to suggest a satisfactory alternative. It appears quite possible, therefore, that Africa since the Mesozoic has seen radical changes in climate, which are not readily explicable but are strongly indicated by biotic distribution.

An alternative explanation for the southward spread of *C. mitis* may be proposed on the basis of its demonstrated adaptability to high-altitude forests, which are found at progressively decreasing elevations toward the southern end of the continent. During a postulated cold phase, high-altitude (i.e., cold-adapted) forest could have had a continuous distribution on the eastern side of the continent, and *C. mitis* with it. This, too, would have been a very ancient occurrence, however, since there are no accompanying Colobus monkeys south of the northern tip of Lake Nyasa, and *Cercopithecus lhoesti*, the other monkey found in high-altitude forests, extends into eastern and southern regions even less.

If the spread of *C. mitis* was very ancient, the absence of greater evolutionary divergence among isolated populations must be explained. This is perhaps the greatest drawback to the hypothesis. However, the structural differentiation of all the species of *Cercopithecus* appears to be remarkably small. Possibly a lack of competition from other monkeys meant smaller

adaptational pressures toward genetic change. Contrast with the situation in the equatorial forest zone supports this possibility. The large number of species in the two great equatorial forest blocks is evidence that monkey evolution in Africa has concentrated most strongly there. Isolating mechanisms are apparent there, but even more apparent is interspecies competition, as demonstrated clearly by Haddow (1952) and Booth (1956b).

The other forest monkeys outside the Congo and Guinea forests are probably relics of later extensions of the lowland forest belt. According to Moreau (1952), the remnant lowland forests of coastal eastern Africa show strong links with the western forests at the generic level, but contain very distinct species. An early connection, followed by a barrier of long duration, seems likely. The forest monkey species are differentiated from their closest relatives to the west, but the resemblance is so great that the tendency among modern authors is to accord them only subspecific distinction. The conservative character of African monkey evolution is again indicated.

The number of these isolated groups is small. *Cercocebus galeritus* and *Procolobus badius* are extremely restricted, the former to a single forest at the mouth of the Tana River, and the latter to only three places: the same forest on the Tana River, the island of Zanzibar, and mountainous regions in southern Tanganyika. This last area is the only mountain-forest locality I can find for the Red Colobus, which raises the possibility that it reached the eastern lowland forest during some extension of the montane forests, along with *C. galeritus*, rather than representing remnants of an older spread of lowland forest. Aside from the *C. mitis* group discussed previously, the only forest monkeys near the east coast are Black and White Colobus. *C. abyssinicus* is represented in many eastern mountain forests, *C. polykomos* perhaps in some, and Black and White Colobus of one or the other variety are found in coastal forests. Their spread by way of montane forest seems quite possible. It should be observed that Black and White Colobus Monkeys are not found along the Tana River nor on Zanzibar. The forests in both localities are to a considerable extent swampy, possibly representing a refuge area where Red Colobus can compete. However, in spite of the strong evidence for the isolation of Zanzibar from the mainland only during the Pleistocene (Moreau and Pakenham 1940), there is evidence also for an earlier spread of *P. badius* into the area, before the differentiation and dispersal of the Black and White forms. In addition to its accompaniment by the lowland forest form *C. galeritus* on the Tana River, there is a Red Colobus form as far west as Gambia, while Black and White Colobus Monkeys apparently extend no farther west than Sierra Leone. *P. badius* thus has the widest east-west spread of any African forest monkey, and its early differentiation must be regarded as probable.

The forest patches in Uganda seem to be largely remnants of a comparatively recent extension of the Congo Forest, judging from the character of the vegetation and the similarity of the monkey fauna. *Cercocebus albigena*, a strictly arboreal form, is found in various forests as far east as the Nile outlet, and it is not sub-

specifically distinct from the representatives of this mangabey in the eastern part of the great forest. Uganda forms of *Cercopithecus mitis*, *Cercopithecus ascanius*, *Cercopithecus neglectus*, and *Colobus abyssinicus*, all of which are forest animals, also are indistinguishable from neighboring Congo forms.

The great adaptability of *Cercopithecus ascanius* of the *C. cephus* group, and its absence from the east-coast lowland forests, invite the assumption that this group differentiated after the final separation of the western and eastern lowland forests. This also lends strength to the idea that *Procolobus badius* and *Cercocebus galeritus* reached this area via an early spread of lowland forest and not by way of montane forest. Since *Cercocebus albigena* extends considerably farther east than the Congo form of *C. galeritus*, it may also follow that *C. albigena* represents a later evolution. Problems of the type of country to which these two species are able to adapt complicate the interpretation, however. The distribution of *C. galeritus* in the Congo Basin is intermittent; the causes remain to be discovered.

Within the Congo forest, the Congo River and the Lualaba appear to be major barriers maintaining distinctions among monkeys. Among the species that are probably limited to one bank or the other are *Cercopithecus cephus*, *Cercopithecus hamlyni*, *Cercopithecus lhoesti*, *Cercopithecus neglectus*, *Cercopithecus denti* of the *C. mona* group, and probably *Cercocebus albigena*. In addition, Schouteden (1947) shows the river to be the boundary for a number of subspecies of species of guenons and *Colobus* monkeys. These facts may help to determine the probable area of origin of a number of species, and to estimate the amount of time involved in differentiation within species and species groups, since the Congo River does not appear to have been a permanent feature of the African scene. The Congo Basin itself dates from the Pliocene, when an enormous lake was formed there. This was drained by the lowering of its western sill and the breakthrough of the river only during the Pleistocene (Moreau 1952), so the Congo River and the major portion of the Congo Forest are relatively recent. Forests around the peripheries of the basin probably date from much more ancient times, however. Because of the probability that monkey species entered the basin from the peripheries as the forest invaded the basin, however, the extent to which the river played a role in the original differentiation of species and subspecies may be difficult to assess.

The Dahomey Gap between the Congo Forest and the Guinea Forest is evidently an even more important natural barrier, and one that offers considerable promise for analysis of African monkey evolution. From comparisons of the mammalian genera of the two adjacent forests, Booth (1954b) concludes that the Gap is of long duration and has been much wider in the past, or a second gap existed to the east. The listing of the monkeys of the two forests, given above, alone suggests that the Dahomey Gap has served to limit a number of species to one forest or the other. However, Rosevear's (1953) distribution maps show, in addition, that a number of monkey species in the Congo Forest are not encountered close to its western border, in spite of the greater species representation there. The Cross River in eastern Nigeria is the approximate western boundary

for *Procolobus badius*, *Cercocebus torquatus*, *Cercopithecus preussi*, *Cercopithecus pogonias*, and *Mandrillus leucophaeus*. The western limit of *Colobus abyssinicus* is somewhat farther east; a Guinea Forest subspecies extends into the extreme western tip of Nigeria. The forest monkeys extending all the way across Nigeria, *Cercopithecus mona* and *Cercopithecus nictitans*, are probably widely adapted to both primary and secondary forest and to forest outliers (Booth 1956a, b). It seems probable that there has been a re-invasion of the Nigerian forest area from the south and east, but that ecological barriers have limited the spread of a number of species. The data on monkey distribution thus tend to confirm Booth's (1954b) conclusion that the Dahomey Gap has been much larger in the past.

This conclusion is perhaps supported by the northern limits of distribution of other species in southern Cameroons. These include *Cercopithecus neglectus*, *Cercopithecus talapoin*, *Cercocebus albigena*, and *Colobus satanas*, all rather widespread species. If southern Cameroons and southeastern Nigeria are taken as a unit, it appears that there is an important barrier in this region too. The forest belt narrows markedly adjacent to the Bight of Biafra, suggesting a bottleneck effect. Certainly studies of the general nature of the forest and differences within it in the Cameroons-Nigeria area should be very important in understanding the ecology and history of African monkeys. Critical problems of differentiation of species of the *Cercopithecus mona* and *Cercopithecus cephus* groups center in this area, in addition to the problems of species boundaries discussed above. The range of forest conditions is supposed to be very large. Southern Cameroons has very heavy rainfall and the richest variety of trees on the continent, while the Nigerian forest is relatively impoverished in species and increasingly approaches minimum rainfall conditions for forest maintenance toward the western border (Richards 1939).

Fernando Po should be a valuable supplementary source of information. Its monkey fauna shows close similarities to the neighboring mainland, particularly southeastern Nigeria. *Cercopithecus preussi* and *Cercopithecus erythrotis* are characteristic of Nigeria; *Cercopithecus pogonias* and *Mandrillus leucophaeus* bridge the narrow forest between Nigeria and Cameroons. *Cercopithecus talapoin* and all members of the genus *Cercocebus* are absent. However, assuring the usual blurred picture of monkey distribution, *Colobus satanas* is also found on the island, but not in Nigeria. In any case, the separation from the mainland does not appear to be very ancient, no matter what the history of faunal connections with the mainland.

A critical examination of the distribution of animals other than monkeys should be a valuable aid in the kinds of historical problems outlined in the preceding discussion. A few pioneering studies illustrate valid approaches. Booth (1954b) used published lists of the locations of mammalian genera to arrive at conclusions about the duration and former extent of the Dahomey Gap. He further concluded that a number of specialized genera absent from the Nigerian forest probably have been unable to re-colonize from the south and east. This



is in general accord with the information on monkey species, and, in fact, suggested a similar interpretation of the monkey data presented here.

A subsequent study by Booth (1958) examines distributions of forest-adapted species groups of Primates, Sciuromorpha, Artiodactyla, and Hyracoidea in a further attempt to reconstruct the history of the Dahomey Gap and the neighboring forests. He concludes that the Gap has been an important isolating agent during drier periods in the past, but that the Volta and Niger rivers to the east and west are today more important in preventing re-colonization.

The much more detailed study of Moreau and Pakenham (1940) exemplifies a closer approach to ideal procedure. Their study of all the vertebrates of Zanzibar and other islands off the east coast is enriched by extensive field experience in the area. Their conclusion that the islands had a mainland connection in the Pleistocene consequently carries great authority. Further studies of this caliber can reduce the areas of uncertainty concerning problems of primate distribution and contribute greatly to knowledge of primate ecology. The discontinuity of ecological zones in many parts of Africa should make such studies interesting and rewarding to field workers.

#### B. AFRICAN MONKEYS AND THE STUDY OF HUMAN EVOLUTION

Assuming that there was nothing miraculous about the evolution of man from primate ancestors, it follows that the potential for paralleling the process is still present and could be realized, given the right circumstances. For those anthropologists who believe that the history of behavioral characteristics in human ancestors helps in understanding man, the possible value of extending the study of living primates and applying the findings to theories of human evolution cannot safely be ignored.

The taxonomic position of Old World monkeys in the primate order is not established. Even the reasonable assumption that the anthropoid apes evolved from a monkey stock (Washburn 1951) is neither supported nor contradicted by the sketchy fossil record (Simpson 1945). Since the basic organization of the head, hand, and foot are so fundamentally similar, however, the monkeys are a necessary consideration in the analysis of higher primate and human evolution, no matter what the sequence and times of differentiation within the order.

Adaptation is a key factor in evolution. More studies of primates in the wild state are required for sound conclusions about the general nature of primate adaptation, and to test hypotheses concerning the processes leading to the evolution of man. Such studies are particularly promising in view of the recent healthy trend in seeking behavioral factors, and the connections between structure and behavior, in evolution (e.g., Roe and Simpson 1958). Already available information about African monkeys may be of critical importance for a number of problems of this kind.

In analyzing differences in adaptation of primate species, Booth (1956b: 129) is careful to point out also major features of behavior common to monkeys in Ghana that lead to a degree of ecological overlap: "All

are diurnal, gregarious, tend to be socially organized, and are to a greater or lesser extent arboreal." On the strength of cases where sufficient information is available, this pattern seems to be fundamental to African monkeys. This observation has extensive implications for the study of processes leading to human cultural adaptation (Dobzhansky and Montagu 1947; Tappen 1953).

Some exceptions to the characterization of African monkeys as diurnal must be mentioned. J. Allen (1925) notes briefly the nocturnal habit of the little-known *Cercopithecus hamlyni*. If this should be verified, it would be interesting to find out if social organization is affected. In short, there is a possibility that the extent of interdependence, if any, of diurnal habits and group cohesion can be analyzed in primates. Bourlière (1952) has described the greatly increased importance of the social group above the prosimian stage, but has not discussed its possible relationship to the diurnal habits of higher primates.

Aside from Haddow's (1952) report of a band of *Cercopithecus ascanius* taking up primarily nocturnal habits under harassment, he and his colleagues, during a number of years of studying monkeys, never observed overt sexual behavior in any species of the genus *Cercopithecus*. Haddow (1952) concludes that it must take place at night.<sup>5</sup> This is one important aspect of the behavior of *C. ascanius*, the most thoroughly studied African monkey, that has not been observed; probably other significant behavior also takes place nocturnally. Keys to the apparent absence of a dominance hierarchy in this monkey, and to the means by which its social organization is mediated, can perhaps be discovered by night-time study, which should be quite feasible with modern technical devices.

Information of importance for research on evolution through primate-behavior studies has resulted from the field work reviewed in this article. For example, the observations of Chance and Mead (1952) on the behavior of captive baboons led them to emphasize the importance of conflict, arising from the almost continuous nature of primate sexual activity, as a factor in human evolution. This emphasis is not supported by the data on *C. ascanius* in the wild state (Haddow 1952). Unless the apparent discrepancies can be reconciled by other studies, or unless the baboons can be shown to be representative of sexual and dominance patterns of primates ancestral to man while Red-Tail Monkeys are on some side branch, it must be concluded that a wider variety of studies is needed before the fundamental patterns and variant possibilities of primate social organization are understood. Again, Chance's and Mead's conclusion is almost diametrically opposed by Etkin (1954), who postulates that modification of dominance relationships by chimpanzees during the female sexual cycle is the kind of factor leading to the co-operative feature of the protohominid family. Differing emphases probably are functions both of differences among the primates studied and in the fundamental approaches of investigators. The need for advances in taxonomy is strongly indicated, to demonstrate degrees of relationship among primates.

Data on African monkeys may also be relevant for studies relating behavioral and morphological features



of primates. Bartholomew and Birdsell (1953) interpret the small canine teeth of both sexes of Australopithecines as evidence that hand-wielded weapons, rather than large canines, were used by males in the struggle to acquire access to females and other rewards of dominance. However, Haddow (1952) found no evidence of fighting and very little sign of male dominance in *C. ascanius*, yet this monkey shows a strong sexual dimorphism in body size and in length of canine teeth. This suggests that factors other than intrasexual competition may enter into such differences between the sexes. It follows that absence of sexual dimorphism in the teeth may have no necessary connection with the handling of tools and weapons. Advances in knowledge are dependent upon stimulating insights such as those of Bartholomew and Birdsell, followed by the hard work of verification or rejection.

A few suggestions for studies of monkeys, based on information in this review, may not be out of place. Emphasis is upon questions that relate primate evolution to broad problems of human behavior. The most promising approach at the present level of knowledge appears to be study of evolutionary processes in primates themselves, on the assumption that there are peculiar features of the order which may allow a precision of analysis not possible with extrapolations from general evolutionary theory or field work on other organisms.

In this light, local differentiation, clines, and species formation in monkeys take on new meaning. Booth's (1954a, 1955, 1956a, b) studies are most revealing. Black and White Colobus monkeys will move into new layers of forest if Red Colobus and Olive Colobus are absent, but the Olive Colobus will not leave its thickets even if other guerezas are absent; the Green Monkey will enter fringing forest only when the Spot-Nosed Monkey or the Mona Monkey is absent; *Cercopithecus nictitans* in the Ivory Coast is confined to primary forest, while east of the Dahomey Gap in Nigeria the same species, with no constant morphological distinctions from the western form, can be found at all levels of secondary forest and in brush country around farms. Similarly, in Uganda the Red-Tail Monkey, *Cercopithecus ascanius*, moves into all levels of the primary forest when competitive species are absent. Thus psychological characteristics of behavior are in these instances associated with habitat and adaptation, and have marked effects upon distribution.

Shifts in adaptive zone, one of the most important of evolutionary processes (Simpson 1944), seem to be of frequent occurrence in African monkeys. Some species appear to be equipped to make these shifts more readily than others.

In addition, it may be that representatives of different species groups have virtually exchanged ecological adjustments in different parts of Africa. In western Uganda, *Cercopithecus denti* of the mona group is at its extreme eastern range in the Bwamba Forest, a continuation of the Congo Basin forest. It is a deep forest form exclusively. *Cercopithecus ascanius* of the cephus group is found throughout much of the Congo Forest, but also occupies outlying forest patches and brush as far east as the Kenya highlands. In Nigeria and Cameroons, on the other hand, *C. mona* occupies the entire forest belt and forest fringes north and west of the

forest belt, while *C. erythrotis* and *C. erythrogaster* of the cephus group have highly restricted forest ranges. Data on the adaptations of these species are scanty, however; further investigation is required to test the prediction that the two groups have forms with reciprocal adaptations. The presence of non-equivalent additional species in the two widely separated areas may further complicate this particular picture. Nevertheless, there is already enough indication that changes in behavior accompanying shifts in adaptation make the social and psychological adjustments in the natural habitat a promising area of investigation.

There is evidence that these processes are going on at the present time (Haddow 1952), in addition to having been accomplished repeatedly in the past.

Studies relating shifts in adaptation with social and psychological adjustments show promise of attacking a central problem of anthropology, namely, the mechanisms of the evolution of learned behavior through the medium of symbolic communication. The role of learning in the behavior patterns in both widely and narrowly adapted monkeys, and its relationship to visual cues and vocal communication, appear to be particularly worthwhile subjects for investigation. Booth (1956a) believes that the distinctive markings of monkey species have primarily a recognition function; monkeys make visual distinctions comparable to those of museum taxonomists. The capacities of the monkey's central nervous system to make such categorizations and to translate them into action may be a key pre-adaptive feature for human evolution.

Although discussion of subspecies has been avoided in this article because of both practical and theoretical objections to their use, there are readily observable differences among local populations, some of which are isolated and others not. Naming each of these a species (this is the tendency in Elliot 1913) obscures a major fact about African monkeys: representatives of readily definable groups appear again and again in Africa, often in widely separated localities. It is probable that many of these are interfertile. Gray (1954) records a number of monkey hybrids obtained in captivity, including some at the intergeneric level. Local differentiation thus provides genetic variability for breeding experiments aimed at problems of gene homologies in man and other primates (Tappen 1954). At the behavioral level, for example, hybrids between *C. nictitans* forms from Nigeria and from Ivory Coast could provide information on inherited and learned elements in the psychological consequences of adaptation to different kinds of forests. In such a manner, valuable laboratory experiments can be designed as an outgrowth of field observations. On the other hand, tests of the ability of species to hybridize, and of the fertility of the hybrid offspring, could give much information about the amount of genetic diversification that has taken place in African monkeys, and thus help in the solution to the many historical problems of their distribution.

Many other kinds of studies readily suggest themselves. Probably few anthropologists would argue the value of further field work. The rich and varied results

of the few detailed investigations indicate the ready rewards. Most monkeys are relatively easy to observe and collect; it is hoped that workers whose primary concern is the behavior of animals in the wild will become interested because of this relative economy of research. In addition, perhaps some social anthropologists should examine the possibilities of concentrating on non-human primates. Their more extensive training in

problems of human behavior should give them greater insights into the best methods of investigation.

In the process, they may well end up finding out more about human behavior by investigating its possible origins in other primates than by studies of human societies, where returns in fundamental knowledge appear to be diminishing and new methods of approach are needed.

## Notes

1. The African experience was made possible by a Fulbright research fellowship and a grant from the Wenner-Gren Foundation for Anthropological Research, Inc. I have profited greatly in the preparation of this article from conversations with Dr. W. C. Osman Hill, Zoological Society of London; Dr. A. J. Haddow, Virus Research Institute, Entebbe, Uganda; and Mr. R. W. Hayman, British Museum (Natural History). Correspondence with Rev. A. I. Good, Wooster, Ohio, and the late Dr. A. H. Booth, University College of Ghana, has been most helpful. Field work in Africa was aided enormously by the co-operation of Dr. Alexander Galloway, Dean of Makerere College Medical School, Kampala, Uganda, and his capable staff. Work in Belgian Congo was assisted materially by the Institut pour la Recherche Scientifique en Afrique Centrale, the Congo scientific institute, through its Director, Dr. Louis van den Berghe.

2. Allen's *Checklist* has been used as a starting point rather than later classifications, because it remains the standard compilation on African mammals, and because it is readily available in libraries. It has recently been reprinted. This note is in answer to a query by Washburn.☆

3. This map has been added at the suggestion of Harlow and Warren.☆

4. Thanks are due to Warren G. Kinzey for pointing out the imprecise initial formulation of this statement.

5. Imanishi [1]☆ writes that no sexual behavior of Japanese monkeys was reported by J. Itani during three years of observation, but that it was found easily after provisioning proved successful. He therefore thinks that it is hasty to conclude that sexual activity of *Cercopithecus* species must take place at night. The observations of Haddow and his co-workers went on over a longer period of time and were supplemented by the efforts of numerous trained native observers, however. Haddow's appraisal of the situation must, therefore, be considered probable. There is also a possibility that provisioning may have upset normal Japanese monkey behavioral patterns.

## Comments

By RAYMOND A. DART☆

Tappen's insight into individual and general problems posed by the living African primates is outstanding. The brilliant part of this review, however, is the clarity and apparent simplicity with which Tappen has concluded each section and the whole paper by outlining the future investigations that await primatologists in Africa, and, finally, the key anthropological issues upon which those investigations should provide basic data. One can only hope that an author who has the ability to visualize the light that monkey distribution can shed on the climatic and faunal history of Africa and incidentally on the study of human evolution will also be enabled financially to undertake or to direct some, or at least the most fundamental, of the works he has envisaged.

By HARRY F. HARLOW  
and JOHN M. WARREN☆

Both of us were very impressed with the manuscript, which is certainly thorough and scholarly. We believe it makes a major contribution, not only in terms of knowledge of geographical distribution of primates in Africa, but also in clarification of the jumbled taxonomy of African monkeys.

By W. C. OSMAN HILL☆

This is a revealing article and ably collates the recent literature into an assimilable whole, as well as incorporating data from the author's personal field experience.

I cannot accept the *cephus* group as here defined, but this is a matter of personal opinion in the present state of knowledge.

By KINJI IMANISHI☆

I have read Tappen's important and well-considered paper with much interest. I support his guiding principle that habitat segregation and species differentiation go hand in hand in the course of evolution, for as an ecologist I have grappled with the same principle for over twenty years.

[1] Habitat segregation seems to be an evolutionary device for avoiding competition between two closely related species and allowing them to co-exist. There are two kinds of distributional phenomena which may be called habitat segregation. One is segregation of two closely related species according to contiguous but usually discrete localities, and Tappen cites many examples of this type. The other is segregation within one and the same locality, this kind being divisible into (a) spatial segregation within one locality, and (b) temporal segregation within one locality.

Spatial segregation within one locality is exemplified where two closely related species are found in one forest locale, one species occupying the typical primary forest, and the other preferring the swamp forest, or one being found always in the higher tree layer, while the other is found always in the middle or lower layers. Tappen cites examples of this kind of segregation.

Temporal segregation within one locality is exemplified when two closely related species occupy the same habitat but regulate their co-existence differentially, according to season of appearance—e.g., among insects with an annual life-cycle. It is also a kind of temporal segregation when, of two closely related species with the perennial life-cycle, one is found in the habitat by day and the other by night. Tappen may be implying that the nocturnal habit of *Cercopithecus hamlyni* is a social response to *C. lhoesti*, which is found in the same locality. From the general trend of primate evolution, however, I cannot help doubting the nocturnal habit of such a high-level primate as *C. hamlyni*. At the same time, it seems hasty to conclude that sexual behavior among *Cercopithecus* species must take place at night because no one has yet observed it in the daytime. J. Itani had not recorded any sexual behavior on the part of Japanese monkeys in Takasakiyama during three years of observations, but easily observed it after provisioning proved successful. Also, habitat segregation within one locality is the product of social relations between two closely related species. If, of two such species, one is diurnal and the other nocturnal, the social relation of these two species

may be dominant-subordinate, the diurnal one being dominant and the nocturnal one being subordinate. And if a dominant-subordinate relationship is fairly fixed, two closely related species may co-exist in the same locality even in the daytime, the subordinate always avoiding encounter with the dominant. I was not able to find an adequate example of this kind of segregation, a segregation of lower degree, in Tappen's paper.

[2] Conceptually opposite from the pole of habitat segregation is another pole, that of habitat concentration, which is characterized by the joint existence in one locality of a mixed group of two different species. Although Tappen quoted Malbrant and MacLachy to the effect that *Cercopithecus pogonias* is usually in the company of *C. cephus* or *C. nictitans* (see p. 99), he did not explain such phenomena, and I suspect this omission is due to his being too faithful to the pole of habitat segregation. It may be that habitat segregation derives from antagonism between two species, while concentration derives from mutual attraction between them. I shall not here discuss what bearing mixed groups have on problems of evolution and adaptation. I would only mention examples of mixed groups that Itani and I found in African forests in 1958. These are two mixed groups of *Cercopithecus cephus* and *C. nictitans* in French Cameroon, one mixed group of *Cercopithecus ascanius* and *Cercocebus albigena* in Uganda, and one mixed group of a species of *Cercopithecus* and probably a species of *Procolobus* in Belgian Congo.

By ARTHUR J. RIOPELLE☆

Although I am not intimately acquainted with the details of the literature cited, not being a professional anthropologist, I can say that I believe this paper to be an important one. Primates, their capacities, and their activities are of interest to anthropologists, ethologists, and comparative psychologists, and Tappen's paper, if circulated among all three groups, will go far as a vehicle of communication among them.

The problems of adaptation listed by Tappen are taken to indicate the limitations of the data collected so far by field-study means. In many respects the problems also represent limitations of the method. Witness, for example, the difficulty of observation of sex behavior. For many problems there exists no easy solution, of course, but for others the psychologist and the ethologist working in conjunction with the anthropologist in laboratory and semi-laboratory situations where variables can be manipulated can make important contri-

butions. I bring these up not because I think Tappen is unaware of them (I am sure he is), but because his article emphasizes problems which representatives of the other sciences will recognize as ones to which they can make a contribution.

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# The Archeology of Bering Strait

by J. L. Giddings

THE Bering Strait region is the traditional gateway to America. Theory has had weary migrants wearing paths across its dried-up floor in glacial times and, later, paddling primitive craft in a determined search for a new world. The archeology of the region steadfastly refuses, however, to divulge the short-term sites of people on the move. It shows, rather, the slowly changing record of several groups of indigenous hunters and fishermen and their descendants, whose artifacts were specialized to a remarkable extent for the taking of food from the seas, streams, tundras, and forests, and whose interests were as local as the shores and river banks on which they dwelt. The sophistication of design in ancient flint work, and later in engraving, does not seem to reflect anxiety or instability such as might have been shown by dwellers in a hostile land. Moreover, the designs on opposite sides of the Strait, and also along the eastern sides of the two seas marked off by the Strait, have long paralleled one another, blending only in part. This is clearly seen in the sites that have emerged during the last three decades. We need not give up the search for evidence of the migration of small bands, or even of uneasy hordes; yet the emphasis can be, for a time, on the cultural stability of a Bering

Strait which is a center, rather than a way-station, of circumpolar ideas.

## THE ASIAN SITES

The methodical detailing of Bering Strait archeology began on St. Lawrence Island. While the island is technically a part of Alaska and the United States, no writer has seriously held that people of any period regularly sailed between it and the mainland of Alaska. The skin boats of Eskimos and their neighbors are unsuited to voyages of such a distance. The large umiaks, though they are recorded as having blown adrift for days at a time (e.g., Collinson 1889: 83), are normally beached after a few hours afloat—not so much because the skin cover is fragile, as in fear that the rawhide lashings will relax and the wooden frame collapse (Nelson 1899: 218). Also, the sailors of skin boats rely upon seeing the land to which, or along which, they are voyaging, for they have no means of sustained navigation once the fog lowers. On the other hand, the inhabitants of St. Lawrence Island, cut off as they are from America, have had no trouble in maintaining close relationships with people of the mainland of Asia, only forty miles away. The Asian affinities of St. Lawrence Island have been known, though seldom stressed, by the archeologists who have worked there. The disparate archeological findings on the mainland of Alaska, and the late start of Soviet investigators on their side of the strait, impress us with our good fortune in knowing that the archeology of St. Lawrence Island is culturally Siberian (see Larsen [1]☆).

The St. Lawrence Island sequences were brought to light between 1927 and 1935 by Collins (1937a) in his excavations especially at Gambell, and by Geist and Rainey (1936) in their excavations at Kukulik. The Gambell sites offer some stratigraphy within mounds several feet thick, but the time order of the several sites depends more on their relative location to old beaches than on comparative stratigraphy. The Old Bering Sea culture deposits lie on a hillside and on the first ocean beach formed at the base of the hill. The materials of the Punuk culture are found in a large mound that ac-

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GIDDINGS began to work among the Malemiut-speaking Eskimos in 1934, recording ethnographic notes and autobiographies. He later developed a tree-ring dating technique for the northern tree-line from western Alaska to Hudson Bay (*Dendrochronology in Northern Alaska*, 1941), and combined precise dating with forest-edge Eskimo archaeology (*The Arctic Woodland Culture of the Kobuk River*, 1952). A member of the Point Hope expedition of 1939, he went on to discover and excavate significant archaeological sites at Cape Denbigh and elsewhere in Alaska and northern Canada.

The present article, submitted on February 16, 1959, was sent to eight scholars for CA☆ treatment (see inside front cover). Substantive comments were returned by Chester S. Chard, Henry B. Collins, David M. Hopkins, Frederica de Laguna, Helge Larsen, and M. G. Levin. Appended "Comments," or references to them in text or notes, are indicated by a star (☆). After reading Collins' long comment, GIDDINGS concluded that it was a welcome and pertinent statement of another point of view that should be printed in its entirety without rejoinder from him.

MAP OF  
THE BERING STRAIT  
REGION WITH  
PRINCIPAL SITES  
MENTIONED IN TEXT

Asian Sites

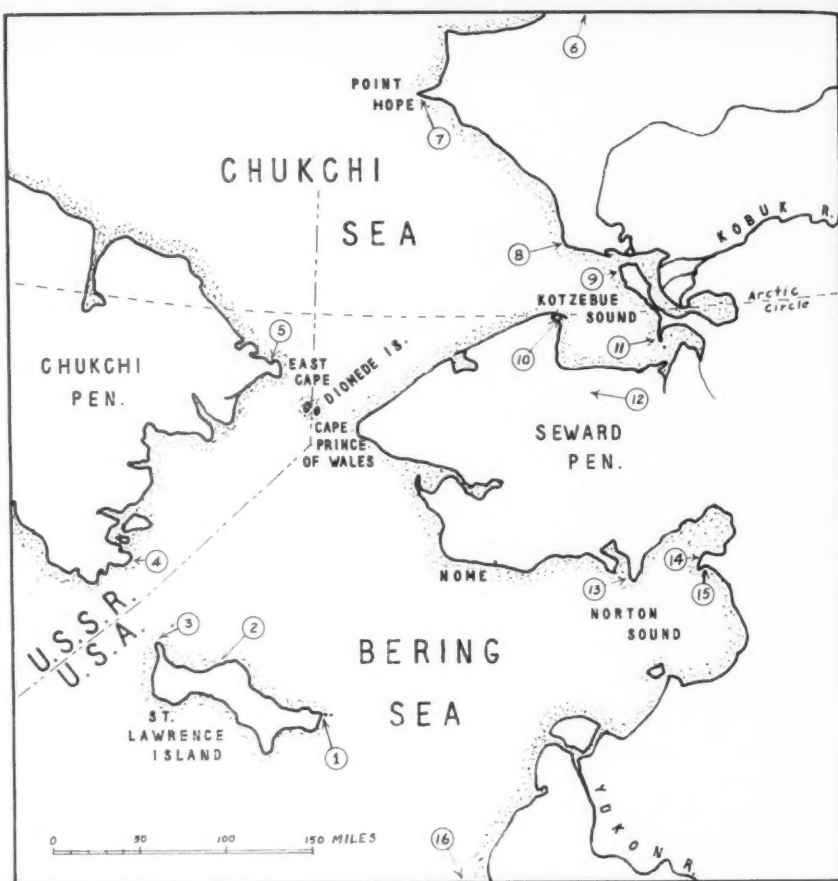
1. Punuk Islands—  
St. Lawrence Island
2. Kukulik Mound
3. Gambell—many sites
4. Indian Point, Siberia
5. Uelen, village and  
archeological sites

America—Chukchi Sea Sites

6. Point Barrow (off map)
7. Ipiutak and other sites at  
Point Hope
8. Cape Krusenstern—many  
sites on old beach ridges
9. Kotzebue, town and  
archeological sites
10. Cape Espenberg sites
11. Choris Peninsula sites
12. Trail Creek caves

America—Bering Sea Sites

13. Cape Darby
14. Cape Denbigh—Iyatayet  
site
15. Cape Denbigh—Nukleet  
site
16. Hooper Bay (off map)



accumulated on a gravel beach which presumably had not existed in Old Bering Sea times, and the more recent aspects of culture occur on still later beaches, culminating in the present ocean-front beach on which is located most of the village of Gambell (Collins 1937a: 31-36, Fig. 2).

The massive mound of Kukulik, some thirty miles from Gambell on the north shore, is over 500 feet long and as much as 14 feet thick. Its stratigraphy bears out nearly the whole sequence of cultures postulated at Gambell.

While all are agreed as to the order of the important stylistic or cultural periods on St. Lawrence Island for perhaps two thousand years, there remains one knot to untie. This concerns the dating of Okvik culture.

The oldest form of culture at both Gambell and Kukulik is the Old Bering Sea. Collins, basing his conclusion mainly upon engraving styles, recognized at Gambell three phases of this culture. Style III is elaborately curvilinear, marking the high point of Old Bering Sea ivory art. Both Style III and the somewhat less elegant Style II occurred in a large mound on the oldest ocean beach at the foot of the hill, but Style II also appeared on objects made by people who had built their houses well up the slope of the hillside, presumably at a time when the sea still washed over the beach at the foot of the hill. Style I is a more angular and simple form of fine-line engraving which appeared in

the hillside house excavations, but in a different context. "That the specimens decorated in this style are actually older than the bulk of the material from the Hillside site is indicated by the fact that most of them were found beneath the floor stones of the two houses" (Collins 1937a: 46). Only a few of these Style I pieces were obtained. Style I has never been found in Kukulik Mound, although both of the other Old Bering Sea styles are well represented near the bottom of the deep deposit (Geist and Rainey 1936: 229-31; Plates 60, 61, 71, and 75).

The early culture called Okvik was defined mainly from a collection of artifacts unearthed by Geist and Ivar Skarland, in 1931, at the eastern end of the island in an unstratified deposit that may have been the edge of a village mound already washed away by the sea (Rainey 1941: 465). Rainey recognized the greater part of this assemblage of artifacts as basically related in form and content to Old Bering Sea culture, but he observed that "the engraved designs . . . are much simpler, more sketchy, more irregular, and less pleasing than the complex curvilinear designs of the Old Bering Sea stage" (1941: 551). While Rainey was preparing his report on the Okvik artifacts, and in need of more cultural details, I had the opportunity to test-trench for him the Gambell Hillside north of the known sites. Here I located a buried house floor for which there were no surface indications. This floor, a large round one,

TABLE 1  
ESTIMATED CHRONOLOGY—BERING STRAIT REGION

DATE	ASIA	AMERICA	
		BERING SEA	CHUKCHI SEA
1900		Recent	Recent
1700	Recent, and Late Prehistoric	Nukleet III	
1500		Nukleet II	Tigara—Arctic Woodland
1300	"Thule—Punuk"		
1100		Nukleet I	Western Thule—Arctic Woodland
900	Punuk		
700	Early Punuk	?	Birnirk
500	"Birnirk"		
300	Old Bering Sea III		
A.D. 100	Old Bering Sea II		Ipiutak and "Near Ipiutak"
B.C. 100	Okvik II—Old Bering Sea I	Norton	
300	Okvik I		
500			
700	?		Choris
900			
1100			
1300		?	
1500			
1700			Krusenstern notched point assemblage
1900			
2100			?
2300			
2500			
2700			
2900		Denbigh Flint complex	Denbigh Flint complex
3100			
		?	?
Much Older			Palisades assemblage

yielded more than 900 artifacts, including engraved pieces showing close relationship (though they were less crude) to the Okvik style (Rainey 1941: 468-72). The collection, not yet on record in detail and no illustration of which has appeared in print, appears to me to represent a period intermediate between the typical Okvik and the Old Bering Sea Style I artifacts previously mentioned for the Gambell Hillside. I shall here distinguish two engraving styles of Okvik, designating the prevalent style<sup>1</sup> of the type site "Okvik I" and of the round-house excavation on the Gambell Hillside "Okvik II." The greater age here attributed to Okvik I is based in part on the knowledge that it has not been detected either at Kukulik or in any of the Gambell sites, where trade pieces, at least, could be expected if it were in part contemporaneous with Okvik II.

Radiocarbon dates recently announced from the University of Pennsylvania laboratory (Rainey and Ralph 1959) may be drawn upon to resolve many problems of dating. Some ambiguities must appear, however, in even the most carefully compiled lists of radiocarbon dates for Arctic sites, because these sites seldom afford organic samples that are free of the kinds of contamination that would give later than actual dates (Giddings 1955). Hence I believe that samples which have been most continuously frozen, and for this reason have been less subject to contamination in the form of root infestation and absorption of seasonal seepage in the wet ground, should receive first reliance. The following attempt at a time order for the St. Lawrence Island cultural phases leans heavily upon the radiocarbon date of  $2,258 \pm 230$  years ago for a single, solid, permanently frozen wood sample found in the round house of Okvik

II culture at Gambell (Rainey 1941: 468-72; Johnson 1951: 15, Sample 505). The apparent reversal of the dates of Okvik and Old Bering Sea cultures in the recent radiocarbon series (Rainey and Ralph 1959: 368-69) is strongly called to the reader's attention. However, the stratigraphy at both Gambell and Kukulik seems to deny such a reversal.<sup>2</sup> The existence of this dating dilemma points up the need for further work on St. Lawrence Island (Larsen [1]<sup>☆</sup>).

The dates offered in the series to follow are round figures, encompassing radiocarbon dates except where specifically noted, yet expanded to meet predicated cultural cross-ties. The Asian sequence is:

*Okvik I* (300 B.C. and earlier).—A cultural phase (or phases as yet undistinguished) of successful walrus hunters, whose ivory was carved with skill into many weapon and tool parts, and decorated with lines and curves in a deeply cut style. Carvings of animals and people are realistic, though slightly grotesque. Some forms of harpoon heads and arrowheads are like those of Okvik II, but coarser. Baleen was fashioned into artifacts, and a whaling harpoon fragment suggests whaling in boats. Flint work was like that of Okvik II, but scarcer, polished slate predominating.

*Okvik II—Old Bering Sea I* (300 B.C.—A.D. 100).—Round houses, perhaps changing to rectangular ones. Burin-like instruments of ground and polished stone were used, and flint work is about evenly distributed with excellent polished slate. Free-hand engraving on ivory is delicate, but employs few curved elements. Whaling is not strongly indicated.

*Old Bering Sea II* (A.D. 100–300).—Fixed villages of square houses with long tunnels and midden mounds appear. Free-hand, curvilinear designs were engraved on ivory with great skill and a fine sense of proportion.

*Old Bering Sea III* (A.D. 300–500).—This is the period of the most elaborate engraving style, which employs many intricate curves and bosses.

*Birnirk* (A.D. 500–600).—This is poorly defined as a separate cultural phase, though it is clearly marked in the stratigraphy by the presence of antler harpoon heads as well as of ivory ones in the Birnirk style of Point Barrow, together with one or two other typical Birnirk forms.

*Early Punuk* (A.D. 600–900).—A transitional period, with an increasing supply of Siberian iron, now used in composite knives, engraving tools, etc. Ivory chains and pendants, perhaps in imitation of metal work, are numerous, while flint work is nearly forgotten. Changes take place in archery, with the advent of the wrist guard, cable bow backing, and plate armor. Whaling in boats is indicated. The curvilinear engraving style has turned geometric.

*Punuk* (A.D. 900–1100).—Punuk engravers covered their ivory objects with bold, geometric designs inscribed with metal tools. Fishing was intensive, especially netting and hooking. Whaling was important.

*"Thule—Punuk"* (A.D. 1100–1500).—A period for which many objects, including harpoon heads and other items of sea hunting equipment, are practically identical in form with those of the Thule culture of Canada and Greenland. Decoration is rare, and it lacks local variation in design. Most of the grosser tools and manufactures are like those of the earlier periods.

*Recent and Late Prehistoric* (A.D. 1500 to present).—The forms of the preceding period continue, with a few style changes, especially noticeable in harpoon heads. Dog traction and a composite pottery lamp assemblage come later, and trade goods are present in quantity after the beginning of commercial whaling in 1848.

Sites earlier than Okvik I probably exist on St.

Lawrence Island, but no sign of them has yet come to light. Boats were almost certainly crossing Bering Strait to the north much earlier than 500 B.C., therefore it seems reasonable that they also crossed over to this island since the challenge to navigation would have been little greater.

Archeologists of the Soviet Union have recently shown that the Asian sites of Bering Sea and Bering Strait contain elements of the St. Lawrence Island phases of culture, but they have reported no new phases. In May of 1958, I was privileged to hear Levin informally describe his and Chubarova's excavations of 1957 near Uelen, East Cape, Siberia, and to examine casts of harpoon heads from an ancient burial ground. Most of the harpoon heads were decorated in Old Bering Sea styles but some burials included typical Birnirk and Punuk implements, and a few engravings were in the Okvik style (Levin [2]<sup>☆</sup>). The neighboring Uelen settlement site earlier excavated by Rudenko had been given the cultural name of "Uelen-Okvik" because its elements were first discovered on St. Lawrence Island (Rudenko 1947: i). While the Uelen-Okvik was estimated to be as much as 3,000 years old (Rudenko 1947: iii), and thus earlier than the dates usually attributed to St. Lawrence Island Okvik, we know little of the origins of the old engraving style characteristic of both, and may find that it was very persistent within a limited geographical range. Since the Uelen-Okvik was originally dated relative to the St. Lawrence sequences, the question of its cultural position remains uncertain. Fragmentary though the sampling of the Eskimo and Chukchi region of the Siberian mainland has been, the art styles, those at least of all of the stages of St. Lawrence Island culture, are found somewhere between Indian Point (the mainland nearest to St. Lawrence Island) and East Cape (Chard 1955; Rudenko 1947), with the possible exception of Okvik II and Old Bering Sea I. Birnirk artifacts exist westward around the Arctic coast of Siberia as far as the Bear Islands. The "Siberian Neolithic," as elucidated by Okladnikov and others,<sup>3</sup> has not yet turned up at Bering Strait (see Chard [1]<sup>☆</sup>), however, nor have the distinctive side blade, microblade, and burin combinations of Cape Denbigh and other localities in neighboring America.

## THE AMERICAN SITES

### BERING SEA

The typically Asian decorative styles on harpoon heads and other artifacts have seldom been found far from the Asian sites described. An Old Bering Sea deposit (including Old Bering Sea I, or Okvik II engraving style) is known from limited searches on Little Diomed Island in the middle of Bering Strait (Collins 1937a: 53–56; Jenness 1928); some pieces of ivory decorated in Okvik II style (possibly traded) occurred in Ipiutak houses at Point Hope (Larsen and Rainey 1948: 73, 143–44); and a few objects decorated in Old Bering Sea style are known from Point Barrow (Ford 1959: 31–32 *et seq.*); but excavations at Cape Prince of Wales (Collins 1937b, 1940) have produced mainly undecorated objects, including Birnirk forms of harpoon heads and a succession lacking the elaboration of style



and art of the Punuk periods in Asia.<sup>4</sup> The southern shore of Seward Peninsula and the eastern margin of Bering Sea were archeologically uncharted before 1948, although recent sites of Indians and Eskimos had been excavated by De Laguna (1947) along the lower Yukon River. Excavations of the last decade at Cape Denbigh (Giddings 1949, 1951; Hopkins and Giddings 1953), Cape Darby (Giddings MS), Hooper Bay (Oswalt 1952), and Bristol Bay (Larsen 1950) further show that the sequences of Asia do not repeat themselves on the American side.

The sites at Cape Denbigh afford the most direct sequence from which to construct a chronology. The stratified site called Nukleet contains three phases of the later, "neo-Eskimo," culture, the frost-preserved artifacts of which are nearly all familiar to modern-day Eskimos. A deposit of "Nukleet culture" is found in another site, called Iyatayet. Here it lies on top of two separate and distinct forms of culture which are entirely strange to the local residents, and thus are of dubious cultural continuity with the Eskimo.<sup>5</sup> The content of the middle levels at Iyatayet, defining "Norton culture," departs strongly from that of contemporary Asian sites. Slate work is represented only by a few crude and scratchy pieces, in contrast to many flints. The pottery is well fired, in contrast to the coarser pottery of neo-Eskimo sites, and seems to be part of a widespread pottery continuum. Norton cultural affinities are seen in the direction of the Pacific coast sites of southern Alaska (De Laguna 1934, 1956; Heizer 1956), perhaps by way of Bristol Bay (Larsen 1950) and the Aleutians (Bank 1953; Jochelson 1925; Laughlin and Marsh 1951). Norton culture also strongly parallels the somewhat enigmatical Near-Ipiutak deposits at Point Hope to the north.

The earliest cultural deposit at Iyatayet is the "Denbigh Flint complex." It is completely isolated from the other deposits where it is undisturbed. A paper-thin layer coating a clay-like podzol formed in a relatively warm period of climate, its contents are small and delicate artifacts of chert, jasper, chalcedony, and obsidian, together with countless flakes, all lying flat upon the single layer of clay. The layer was subject to a peculiar folding at some time after the organic matter was already lost from the cultural deposit and when the ground for a limited time was permanently frozen (Hopkins and Giddings 1953: 17-19, Fig. 6). The dates thus far obtained by radiocarbon analysis involve some contradictions, as acknowledged by Rainey and Ralph (1959: 373-74). All samples were soil scrapings assumed at the time of their collection to be contaminated with later carbon (Giddings 1955). The overlying peaty layers, manifestly much later than the cultural layer, yielded dates earlier than most of those of the Denbigh Flint complex. David M. Hopkins, who studied the geology of the site, re-appraised the dating of the Denbigh Flint complex layer at Iyatayet, in May, 1958, concluding in a letter to me that:

The radiocarbon evidence indicates an age between 4,200 and 5,000 years; the paleoclimatic evidence permits an age no greater than 8,000 years; and consideration of the time required for geologic processes permits an age no younger than 4,500 years. It appears to me that the Denbigh Flint Complex at Iyatayet is between 4,500 and 5,000 years old.

The estimates pertain to the final dating of the cultural stratum, however, and scarcely allow for the probably long span of time during which the techniques of the Denbigh Flint complex were practiced in the region.

The dating of the Denbigh Flint complex is of far-reaching importance because this cultural manifestation has elements in common with distant parts of three continents. Present are large numbers of burins in a range of types comparable to those of the Old World west of Siberia; many artifacts made of burin-sharpening spalls; bifaced projectile points, including diagonally flaked specimens and a fluted point, reminiscent of those of the western plains of the United States; and quantities of microblades and delicately bifaced side blades reduced with unmatched precision from microblades. The Denbigh Flint complex was, until 1959, the oldest assemblage to be identified in coastal Alaska. The microblade, burin, and side-blade increments of this complex have been recently shown to have, separately, a wide distribution in arctic America, including the northernmost tip of Greenland (Knuth 1954). Their combination and technique of manufacture varies greatly, however, with both area and time level.<sup>6</sup>

The following chronology is suggested for the Bering Sea area by a considerable body of radiocarbon dates (Rainey and Ralph 1959) and by cross-cultural comparison for the later phases:

*Denbigh Flint complex* (earlier than 2500 B.C.).—The organic forms of this culture are unknown, but wide-ranging affinities in flint work, mainly circumpolar in nature, include a high proportion of burins and worked burin spalls of special types, and the microblade-and-core as a basic technique. Delicate, diagonally flaked side blades are numerous. Some of the larger bifaced points closely resemble some from the early western American Plains. House forms are unknown.

(Hiatus)

*Norton* (500 B.C.—A.D. 400).—Village sites of square houses with short entrance passages contain hard, thin, sand-tempered pottery; extensive flint work including small, bifaced side blades and end blades, flake knives, and several scraper forms; polished hard stone, but rudimentary scraped and ground slate; many stone net sinkers, drill bits, stone lamps and stone dishes; large, medial labrets of stone; crude toggle harpoon heads, some lacking line hole; and heavy stone tools. Engraving art appears negligible. Affinities are with Near Ipiutak culture and Pacific sites.

(Hiatus)

*Nukleet I* (earlier than A.D. 1200).—Villages of deeply tunneled houses in midden deposits are those of intrepid hunters of white whales and seal. Small pendants and other ivory objects, including one form of harpoon head, are reminiscent of Early Punuk. Most styles change only slightly in later periods, however, which indicates a long-persisting local tradition. Other traits are polished slate, beavertooth whittling, birch-bark utensils, extensive fishing, and a coarse, "Eskimo," pottery unlike that of Norton culture.

*Nukleet II* (A.D. 1200-1400).—Closely parallels Western Thule sites of Kotzebue Sound and Point Hope in harpoon heads, arrowheads, etc., but many restricted local styles also occur, especially in objects concerned with woman's work.

*Nukleet III* (A.D. 1400–1700).—A new and improved pottery technique appears, including coarse sand and shell temper, large vessels, and bold decorative designs. Styles in harpoon heads are increasingly local. A heavily sinew-backed bow accompanies minor changes in archery.

*Recent* (A.D. 1700 to present).—Beads, metal, tobacco smoking, and dog traction add on to the prehistoric base. There is less engraving than in the Nukleet periods.

The cultures of the northern Bering Sea region give no sign of having originated directly, in any period, on the Old World side of the Strait. With the exception of a few isolated harpoon heads decorated in the precise style of heads from Early Punuk levels on St. Lawrence Island, neither the artifacts nor the assemblages of any Norton Sound time period could be mistaken for those of near-by Asia. The Denbigh Flint complex has yet to be identified, even in small part, across the Strait. One could, of course, speculate about a very tenuous tie across Siberia, one to three thousand miles away, in the Kolyma, Lena, Yenesei, and Ob drainage systems. In so speculating, we should see that most basic techniques of the Denbigh Flint complex occur in the Siberian Neolithic but that the derivatives of those techniques in Siberia are dissimilar to those of Alaska and that nearly all are associated with pottery. Furthermore, the Denbigh Flint complex has finer chipping and a higher development of burins and side blades than has the Siberian Neolithic. The lack of burins in most of the Siberian Neolithic sites suggests a possibility that the few burins described from the Lena and Kolyma basins (Michael 1958: 74–75, 78–79, 93–95) are the result of diffusion from Bering Strait. The relationship of the Denbigh microblade-and-core technique to that of Inland Alaska, on one side (Nelson 1937; Rainey 1939), and to that of the Asiatic steppe zone, on the other (Chard 1959), needs to be clarified by a precise chronology. Also, we await with interest reports in progress on burin assemblages to the south in Hokkaido (Chard [2]☆).

The nucleus of the old Cape Denbigh culture may have been the special combination of sea, river, forest, and mountain food resources to be found in only limited parts of the Bering Strait region. In reduced or related forms, its flints are known from mountain-pass sites of the Brooks Range and also at the forest border. We found traces of the Denbigh Flint complex in 1958 on ancient sea beaches in two localities of Kotzebue Sound. Here, as at Norton Bay, the forest reaches the sea, and the food resources are various. Sites of this complex were not known far from the resources of the forests and rivers until 1959, when we discovered them on an old beach near Cape Prince of Wales.

The Denbigh Flint complex appears unique in its variety of flint forms, in its precision of craftsmanship, and in its range of techniques. Since it is demonstrably old, and is now known to have been well established in coastal western Alaska, we need not derive it from any other part of the world.

#### CHUKCHI SEA

The segment of Alaska bounded on the west by the Chukchi Sea, extending from Bering Strait around the deep indentation of Kotzebue Sound and inland, and northward to Point Barrow, was known archeologically

before 1939 only for a few chance collections and for the type site of Birnirk culture at Point Barrow.<sup>7</sup> Then, the incredibly large Ipiutak site of houses and burials came to light at Point Hope, with enough other cultural remains to outline a nearly complete sequence to modern times (Larsen and Rainey 1948). No theorist had predicted anything like Ipiutak. Lacking pottery, lamps, and polished slate blades, as it did, and containing thousands of delicate flint knives, points and side blades for inseting, together with elaborate ivory carvings and new forms of artifacts, Ipiutak gave a first impression of being out of line with other Arctic sequences and very much older than other phases of culture known at that time. However, a closer analysis revealed such components as Scytho-Siberian animal art styles in ivory sculpture; the presence of a few carvings in Okvik II style, which were possibly trade pieces; and the use of telluric iron, which was probably not available from Asia until a few centuries B.C. (Larsen and Rainey 1948: 83, 135–46). A radiocarbon date of about 1,000 years elapsed time, which was published eight years ago for the site, is patently in error as a date for the Ipiutak culture proper, and should never have been permitted to cloud the abundant evidence of greater age. Nevertheless, the full placing of Ipiutak culture in time and cultural sequence is yet to be accomplished.

Cultural manifestations following Ipiutak at Point Hope are Birnirk, Western Thule, Tigara, and Recent, in the order given. The differences between Ipiutak and Birnirk artifacts and techniques are so great that they suggest a long time span between the two cultures. Later cultures, however, move in easy transitions from one conformation to the next. They all contain a great majority of forms that are easily recognized by Eskimos. The pottery is black, coarse, and crumbly; the slate knives and points are highly polished; and the basic methods of hunting and fishing are practically the same in all periods, with only slow stylistic change through time and the addition of new trade goods from Asia. Ipiutak artifacts, on the other hand, were more easily identified in the field by the archeologists, who drew upon their background of general knowledge, than by the Eskimo assistants, whose puzzled explanations were often ludicrous.

A few excavations near the Ipiutak houses yielded pottery, stone lamps, and other elements unlike the majority of the Ipiutak houses and burials, and these were segregated in analysis as "Near Ipiutak" culture. It has since become clear that most of these finds are closely similar to the Norton culture of the northern Bering Sea region. The relationship of Ipiutak to Near Ipiutak is far from settled, however. If the Near Ipiutak people were known to those of Ipiutak, either early or late in the existence of Ipiutak village, it seems strange that no borrowing of Near Ipiutak pottery, slate, lamps, or distinctive forms of artifacts is to be noted in the contents of the dozens of excavated Ipiutak house pits and burials. If the dating of Ipiutak should prove to be early enough, then Near Ipiutak would fit in as a cultural expansion from the south, filling a logical gap between Ipiutak and Birnirk cultures. Should Near Ipiutak turn out to be the earlier aspect, however, we would be obliged to view the Ipiutak people as incredibly stubborn or self-satisfied and unwilling

to get in step with the cultural changes to be seen on all sides.

Certain it is that pottery, slate,<sup>8</sup> lamps, and other continuities with Asia were on the Alaskan scene before Ipiutak. The Choris culture has taken shape from sites excavated in 1956 (Giddings 1957) and 1958 on old beach ridges at Choris Peninsula, in Kotzebue Sound. The large oval house pits that furnish the earliest manifestations of this culture are around 3,000 years old, as determined in part by radiocarbon dates (Rainey and Ralph 1959: 370). Closely related to the southern Norton culture, but lacking many of the elements of Norton, such as net sinkers, polished adz blades, oval lamps, and side blades, this culture has some points of resemblance in flint work to the Denbigh Flint complex. Large weapon points, for example, are flaked diagonally with skill, and in styles recalling those of the western United States. Almost wholly lacking, however, is the "small tool" combination, including the microblade technique, burin-making, and the practice of inseting side blades. Choris people etched on ivory sparingly, but with extremely fine-line designs. They kept no dogs, and they appear to have preferred caribou to sea mammals as food. Scapulimancy is strongly indicated. Their sealing dart heads were elegant, but their knowledge of the toggle harpoon appears to have been rudimentary. Thus far, no counterpart to the Choris culture is known from Asia. Flints like those of Choris turned up last summer on old beach ridges at widely separated parts of Kotzebue Sound, suggesting that it was a well-established culture in Alaska, perhaps in the line of development of the later cultures out of a Denbigh Flint complex base. The materials from limestone caves excavated on Seward Peninsula (Larsen 1951) will help to define sequences of Kotzebue Sound cultures when they are fully described. The distinctive flints of the Denbigh Flint complex, as was noted above, were found on the oldest beaches of Kotzebue Sound in 1958 and 1959, presumably dropped there by campers long resident on the local scene, at a time immediately after the sea reached its approximate present level some 5,000-6,000 years ago.

A surprising turn of our Brown University 1959 field work at Cape Krusenstern was the discovery, on ancient beach ridges between those containing Denbigh Flint complex and later ridges containing Choris-like pottery and flints, of a site in which the projectile points are meticulously side-notched, and in which occur few continuities of flint work with the previously known traditions. The makers of the new flint forms were primarily seal hunters and whalers. A careful analysis of this and other 1959 discoveries has not been made.

Still another notched point horizon was found on a bench on a mountainside behind Cape Krusenstern. There the points are cruder, and stubby, and accompanied by heavy-flake and large-core tools. Chemical changes in the cherts of this "Palisades" complex suggest that they are very old. The site has been subject to no glacial disturbance in Wisconsin times, and thus carries possibilities of great age.

The later Chukchi Sea sites, especially those of Kotzebue Sound (Giddings 1952a, 1957; Van Stone 1955), show lines of strong continuity with the interior. Beavertooth knives, birch-bark baskets, and jade and

flints from the mountains of the Brooks Range are some of the inland manifestations widely distributed along the coast. The wooded streams of western Alaska appear to have long supported populations culturally distinct from those of the coast, though the two population groups were separated by no barriers to diffusion. The Kobuk River inhabitants of the last eight hundred years, at least, may have spoken Eskimo, as they do today. The "Arctic Woodland" culture has been defined as an inland continuity paralleling that of the coast, with no implications of language or physique, but only of locally changing practices strongly dependent upon seasonal moves within a varied hunting range that is largely forested (Giddings 1952a). The recent discoveries (p. 125) in the mountain passes of the far interior reveal assemblages somehow related to Ipiutak, Choris, and Denbigh Flint horizons on the coast. The forests and tree lines, as well as the coasts, may thus have been continuously occupied down through the millennia.

The succession of Chukchi Sea cultures is summarized as follows:

*Palisades assemblage* (earlier than Denbigh Flint complex).—

A flat-topped mountain-side bench contains encrusted, as well as chemically altered, chert artifacts together with some of obsidian. The stubby bifaced projectile points are side-notched with concave bases. Large and small flake and core tools occur. The blade technique was in use. Further work at the site is projected.

*Denbigh Flint complex* (earlier than 2500 B.C.).—See p. 125.

*Krusenstern notched point assemblage* (earlier than 1500 B.C.).—A house with rounded walls of upright timbers, short passageway and small lateral room, containing notched points of many sizes, notched scrapers, "whaling harpoon blades" and other unexpected forms like none of the flints preceding or following. Dependence on seal and whale. Further work projected in 1960.

*Choris* (1500-500 B.C.).—Large, oval houses, with above-ground entry, were perhaps communal. No dogs were kept. Caribou hunting was more important than sealing, and caribou scapula divining is indicated. The larger weapon points are diagonally flaked; flints are numerous and varied, but include almost no microblades, side blades, or burins. Slate objects are few and scratchy. The pottery is thin and fiber-tempered. Engraving in ivory is extremely fine-lined. Needles are abundant.

*Near Ipiutak* (either earlier than A.D. 100 or later than Ipiutak).—This poorly defined Point Hope phase is like Norton culture of the Bering Sea in most identifiable traits. Present are pottery, slate polishing, and lamps.

*Ipiutak* (A.D. 100-500).—A large village of square houses with central fireplaces and detached, passage-like excavations in front; elaborate tomb burials, some multiple; and fanciful grave goods. Elegantly bifaced thin flints were inset or end-hafted in various ways. Art in engraving and sculpture shows Scytho-Siberian affinities. Lacking are pottery, polished slate, lamps, whaling, and netting.

*Birnirk* (A.D. 500-900).—This phase is distinguished from the succeeding ones mainly by the presence of multi-spurred harpoon heads, some with side blades, and special forms of throwing board, adz handle, and arrowhead stem. Coarse pottery with a curvilinear stamp first appears here.

*Western Thule—Arctic Woodland* (A.D. 900-1300).—In a coastal-inland dichotomy, the extensive use of birch bark and other forest products of the interior contrasts with the emphasis on sealing and whaling at the coast; yet strong



cross-ties are seen, with some evidence of summer trading fairs at the coast like those of historic times. Textile-impressed pottery and local engraving styles are among the features distinguishing it from Canadian Thule culture. Some affinities with Early Punuk appear.

*Tigara—Arctic Woodland* (A.D. 1300–1700).—A late Thule-like cast of culture, with inland-coastal dichotomy continued, is distinguished by an extensive jade industry, changes in forms concerned with archery, and the use of labrets and plate armor. Extensive whaling is practiced.

*Recent* (A.D. 1700 to present).—Some new elements are glass beads, metal in quantity, tobacco smoking, extensive dog traction, lunate stone lamps, and pictographic engraving.

## DIFFUSION

The spread of ideas among the aboriginal peoples of the Bering Strait region has been continuous, yet independent of migration for at least two centuries. None of the dialect groups has noticeably shifted its range during this time. Europeans have come and gone, and with each surge of outside influence the natives have altered their ways; yet the local groupings have emerged from every European wave with their same relation to the land and shores. Diffusion requires, in theory, little more than the light brushing-together of distinct ethnic groups somewhere at their margins. Whatever may have been the degree of drifting of myths and mannerisms, however, Bering Strait diffusion included an intense trade of material things.

Before New England whaling ships invaded Bering Strait in the middle of the nineteenth century, the Malemiut and Asiagmiut of coastal Seward Peninsula controlled the passage of goods across the Strait. Proud and haughty, and including among them occasional six-footers, the crews of large skin boats sailed the American coasts of the Chukchi and Bering Seas, collecting and transporting the commodities to be disseminated both east and west. The American staples were the skins of marten, fox, and muskrat. These were destined largely for China and Europe. But the Eskimos offered other classes of goods, perhaps for more local consumption in northeastern Asia—walrus ivory, rabbit skins, nets, tailored parkas, pemmican-like sausage packed in deer gut, objects of jade and copper, wooden vessels, raw-hide line, and the like. The Siberian staples were bundles of leaf tobacco, the skins of domesticated reindeer and clothing made of these, iron knives, lances, and kettles, and such luxuries as glass beads and metal bells. Trading "fairs" were held annually at Kotzebue Sound, at Point Spencer, near Bering Strait, and elsewhere in Alaska. The Kotzebue fair regularly attracted a thousand or more people from local and distant points, including Siberia, and drew to market the goods hoarded from inland exchanges made during the previous winter on a ceremonial or partnership basis. Transported east across Bering Strait by the Malemiut, or by middlemen of the Diomedes, or by the Asian boat-owners themselves, the American goods were given in exchange to the *kavralit*, or "rovers." The latter were Chukchi trading specialists who by either dog sledge or reindeer train transported the goods to one of the Siberian fair sites, preferably that of the "great fair" at

Ostrownoie, near the mouth of the Kolyma River. American furs then went by horse-drawn sleigh to Yakutsk and on to the European or Chinese centers, while the rovers re-loaded with tobacco, trinkets, metal, and sometimes liquor for the Eskimos.<sup>9</sup>

The brisk, and truly circumpolar, trade through Bering Strait changed radically after trade goods from New Bedford, Honolulu, and other world ports began, in 1848, to come each year on whaling ships and trading vessels. Yet old patterns of trade have continued on a smaller scale to the present day—or, at any rate, until very recently, when the plying of skin boats across the strait was forbidden on an international basis.

Risky though it is to project recent cultural patterns far back into time, we may look at some of the evidence that trade across the Strait has not been confined to the historic period. Archeology shows that the peoples of Bering Strait for two thousand years at least made a living very much as they did at the time of their discovery by Europeans. The environment in which they lived is delimiting in many ways, and the archeological remains are both abundant and explicit. We are encouraged to attempt cultural reconstructions that would be impossible in regions where the climate is tolerant of many cultural patterns and the artifacts in the ground are few. Diffusion is implicit in many of the broader categories of subsistence, such as in fishing with nets, hooks, and leisters, and in hunting with throwing boards and in skin boats. Beyond these general considerations, which tend to make one feel at times that circumpolar people are all "Eskimos," there are specific evidences of trade.

In the later prehistoric periods are found "Thule" types of harpoon heads in the sites of both Asia and America which are so nearly duplicates as to suggest that they were made by one and the same person. Harpoon heads of a specific Early Punuk form and decoration occur as rare items in two separated but nearly contemporary Kotzebue Sound sites. Birnirk style harpoon heads of antler occur in sites as far away as Point Barrow, the East Siberian Sea, and even on St. Lawrence Island where deer were not indigenous. An Okvik II style harpoon head turned up in one of the Ipiutak houses (Larsen and Rainey 1948: 142), and Old Bering Sea heads occur along with Birnirk types at Point Barrow (Collins 1935: 462–63). Among other indications of visiting or direct trade are artifacts of Kobuk River jade found in sites of St. Lawrence Island, Norton Bay, and elsewhere; iron tips or traces of iron in engraving tools and composite knife handles at least as early as Early Punuk culture on St. Lawrence Island and in sites as old as Ipiutak in Alaska; and Okvik II style engravings on several ivory objects found at Ipiutak. Many other close resemblances on all time levels may result from imitation rather than trade. Not to be overlooked are the technical relationships between the Denbigh flints and those of the Siberian Neolithic.

## TRADITION

While the peoples of the two sides of Bering Strait show no signs of having been cut off from one another

for as long a time as archeology affords a continuous record, neither do they seem to have wandered aimlessly, nor to have migrated with purpose in such a way as to vacate a region. The evidence afforded us by a site which has been occupied for a while and then abandoned can be read in two ways. Its people and "culture" may have come in from somewhere and then moved on, or they may have been continuous in the area—the particular site being the only one discovered of many camping places. The first view, attractive as it is to those who see their arctic people as determined plodders, receives the least direct support. Sites of Okvik and Old Bering Sea culture, for example, have not yet been found on the American continent, far less in distant parts of the world. Nor has Ipiutak culture turned up at any great distance from the type site, regardless of the resemblance of its art styles to those of distant central Asia. Not even the "Thule" sites of the west, however much some of their particulars may resemble those of eastern Thule culture, need be attributed to migrants out of distant Canada though this can be debated (Larsen [2]<sup>19</sup>). Instead, it is beginning to look to me as if none of the coastal assemblages of the Bering Strait region, as far back in time at least as the Denbigh Flint complex, has originated elsewhere. Techniques and forms may be traced outward into space (the microblade and core, for instance, from the Denbigh to the Dorset area), but the degree of assemblage which would be needed to postulate a migrant tribe or even a permanently uprooted family seems to be lacking.

Very strong evidence exists, on the other hand, for the continuity of a population within its own district. Three zones of archeological tradition have been indicated for the Bering Strait region. The same zones have not shown signs of breaking with tradition in historic times.

The fact that both Chukchi and Eskimo dialects have been spoken on the western side of the strait seems to have no negative implication for the distinctiveness of Asian tradition. Some ways in which both Asian Eskimos and Chukchis behave differently from American Eskimos are the following: Asian women wear a combination suit as an outer garment; infants are kept in a combination suit and carried on the shoulders, rather than naked within the mother's garment; women are tattooed, often in elaborate scrolls on the face, arms, and breasts; and the winter house is a skin-covered yurt, or half-underground equivalent, provided with inner skin tents as sleeping quarters; the kayak was known but not much used by these Asians in historic times (although it was an element of Late Punuk culture); labrets were rarely worn, if at all; heavy rawhide armor was used, as well as the widespread plate armor; and the mythology and ceremonial practices contained many elements unfamiliar to the Americans.

Differences between the two American Eskimo groups are less sharply defined and relate more often to local resources. The Bering Sea Eskimos were accomplished weavers of grass into mats and baskets, and users of salmonskin for clothing and containers, while the Chukchi Sea Eskimos made little use of these materials. The sweat bath for men, both within the ceremonial house and separate from it, was integrated with the southern ceremonial life, as were elaborate

masks and long, complicated death feasts and trading pageants. The northern pageantry was directed more towards enticing and propitiating whales and other large game. Some other traits typically southern were splint fish traps, fish spears and arrows, cord attachers, hunting visors, story knives, and painted life figures, while northern traits include conical tents and burial structures, equipment for the breathing-hole hunting of seal, pictographic engraving, and a skilled flint technology long outmoded elsewhere in the region.

The emphases to the north on whaling, ice hunting, and the later extensive use of dog traction align this area somewhat more than the southern one with that of the Canadian Eskimo. The Eskimos of the Kobuk and neighboring rivers, with their long-persisting uses of forest products and inland resources such as for birch-bark boats and containers, beavertooth knives, year-round fishing practices and devices, and jade manufacture, might be conceived as defining still another body of tradition, though they are here subsumed under the north Alaskan heading.

The persistence of tradition in one archeological area and another becomes increasingly evident as more and more work is done. On St. Lawrence Island, for example, the great Kukulik mound shows continuous (or almost so) occupation since Old Bering Sea II times. It was abandoned when epidemic and heavy drinking decimated its occupants in A.D. 1884. Only slow change in artifact style and a gradual loss of the art of engraving are seen in the accumulation of artifacts spanning 2,000 years. No basic change appears abruptly in the pattern of subsistence, and only a few exotic elements were introduced before the coming of Europeans. The Kukulik tradition, with the addition of the Okvik styles at the early end, is duplicated elsewhere on the Island, and, presumably, on most of the adjacent mainland as far as East Cape. In the Bering Sea area there are blank spaces in the earlier record (probably to be filled by known sites which are not yet excavated), but none for over a thousand years back from the present day. The Chukchi Sea sequence also becomes more complete with each season's excavation. The great continuity upward through time in the three distinct Bering Strait cultural areas lends assurance that there has been little real migration of groups during two thousand years at the very least.

It is much too soon to place the rich Alaskan sites and cultural phases, just now emerging, into a rigid scheme of prehistoric development. The gaps in our knowledge are still numerous. Nor have sites such as Ipiutak, Choris, and those of the notched points at Cape Krusenstern been predictable on the grounds of what was already known. Arctic archeology is in its infancy, and it cannot yet be enjoined to reach out and connect the archeology of the East with that of the West. However, a few conclusions may be drawn, and, with them, a modifying note or two added to earlier theory.<sup>10</sup>

1. None of the truly well-defined cultural phases in the Bering Strait area (not even those called "Thule") can be duplicated at a great distance in such a way as to document the persistent movement of a group. On the contrary, where the archeology is continuous, as in the Kukulik mound, group

attachment to a home ground is implicit.

2. The diffusion of ideas appears to have been aided, rather than retarded, by the stability of groups. Inter-continental trade smoothly flowed over language and dialect barriers in historic times, as it probably also did in the near and farther past.

3. The complexity of culture has proven to be greater at Bering Strait than in the immediately neighboring regions, either inland or coastal, causing doubt that origins, at least for some thousands of years, need be searched for elsewhere than in the region itself. While the known processes of local diffusion would insure a transfer of ideas, including perhaps such abstractions as art elements and mythological themes, across great distances, these would fall far short of transferring whole cultural patterns. The origin of a Bering Strait

"culture," at any rate, has not yet been established in another area.

4. If the Bering Strait region had been early proposed as a culture center, and its culture area as a broad one embracing several linguistic groupings both in Asia and America, there might have been avoided much of the ambiguity of the currently recognized "Arctic Coast" or "Eskimo" culture area in North America. The Bering Strait region appears to be rapidly defining itself, through its emerging archeology and co-traditions, as such a culture center.

While theory nests down to the slow hatching of facts, however, we may look forward to a rich series of disclosures in the sites that are sure to be found and dug in this area where two continents meet.

## Notes

1. The collection from which Okvik culture was defined probably includes the artifacts of later cultures as well as of more than one (three, as Larsen [1]☆ suggests) Okvik style. Nevertheless, most of the illustrated artifacts (Rainey 1941) appear to be decorated in a coarse style distinct from that of the house finds at Gambell.

2. All three house deposits on the Gambell "Hillside" contained some of the Okvik or Old Bering Sea Style I engraving, the round house only that like Little Diomed Island, Collins' House 2 only his "Old Bering Sea Style I," and Collins' House 1, both Old Bering Sea Style 1 and Style 2. In the last instance, the Style 1 engraved pieces lay only below the floor stones of a house otherwise containing typical Old Bering Sea Style 2 art (Rainey and Ralph 1959: 362). Adding to this the fact that a huge mound lying at the base of the hillside has produced only the Old Bering Sea Styles 2 and 3 along with Punuk engraving, and the failure of Kukulik mound to reveal Okvik or Old Bering Sea Style I engraving, there seems little reason to change the older interpretation. Descriptions of the sites are to be found in the reports of Collins (1937), Geist and Rainey (1936), and Rainey (1941).

3. For details and a bibliography of Siberian "Eskimo" and "Neolithic" archeology, see Chard 1955, 1958; Michael 1958; Shimkin 1959; and Tolstoy 1958.

4. New light on this subject was cast by Brown University investigations near Wales in June and July of 1959, however. A whaling harpoon head decorated in Old Bering Sea Style II was found in a site more nearly related in stone work to Norton culture. Earlier sites containing mainly stone artifacts were also located in this vicinity, the earliest of which contains objects of the Denbigh Flint complex.

5. The concepts of "neo-Eskimo" and "paleo-Eskimo" cultures, as presented

by Larsen and Rainey (1948:182-84) in modification of the ideas early advanced by H. P. Steensby and Kaj Birket-Smith, are very useful in distinguishing the extensively slate-using, midden-building Eskimos from those who relied more heavily on the resources of the interior and retained, until quite recent times in some areas, highly skilled and varied flint-working techniques. Whale hunting is usually associated with the neo-Eskimo groups. A vital question about this dichotomy seems to be whether or not the primarily linguistic label "Eskimo" should be applied to any of the older cultures of the general region. In any event, an early (Larsen [2]☆), as well as a late, dichotomy between inland-centered and strictly coastal groups is strongly indicated.

6. See, among others: Campbell 1959; Collins 1956; Harp 1951, 1958; Irving 1953; Knuth 1954; Larsen and Meldgaard 1958; MacNeish 1956; Mathiasen 1958; Meldgaard 1955; and Solecki 1950, 1951.

7. The original excavations by W. B. van Valin were described in brief by Mason (1930). More recent and exhaustive work in the Point Barrow sites is detailed by Ford (1959) and is in process of description by Wilbert Carter. Other Point Barrow archeological collections are treated by Stefansson (1914a), Wissler (1916), and Mathiasen (1930).

8. While the polishing of slate need no longer be regarded as an early gift of Europe to America (Chard [3]☆), the advanced polished slate complex of the Okvik and Old Bering Sea cultures seems to have had no contemporary equivalent on the Alaskan side, where only the rudiments of grinding previously chipped slate is found in the "paleo-Eskimo" sites.

9. The principal sources for these notes on circumpolar trade are Bogoras 1904-1909; Cook and King 1784; Sauer 1802; Kotzebue 1821; Beechey 1832; Zagoskin 1847; Wrangell 1844; and Stefansson 1914b.

10. Fuller statements of the author's

theoretical position have been printed elsewhere (Giddings 1952a:111-18; 1952b; 1954:86-88).

## Comments

By CHESTER S. CHARD☆

I heartily endorse Giddings' concept of the Bering Strait area as a long-standing culture hearth of major significance with apparently indigenous cultural traditions. His sub-areas seem well-founded, and I applaud his inclusion of St. Lawrence Island with Asia. His estimated chronology is sensible and reasonable in the light of present knowledge. All in all, I am in general agreement with the views and conclusions set forth in his paper.

I am particularly glad to see that the author apparently accepts Hopkins' new dating for the Denbigh Flint complex (2500-3000 B.C.). This is in complete harmony with the evidence as seen against the larger background of inter-hemispherical culture history.

Some specific comments on minor points:

[1] The Siberian Neolithic will probably not appear at Bering Strait, since it seems strictly inland and is never found on the coast, or nearer than about 50 kilometers. However, it does extend to within 200 miles of the Strait (1957 field work at Amguema and Vankarem rivers), so that its influence in the area must certainly be reckoned with.

[2] Giddings' suggestion that the scattered burins in the Lena-Kolyma Neolithic may have an Alaskan origin should be held in abeyance until we know more about the burins of Hokkaido. This matter will be under investigation at the University of Wisconsin in 1959-60. The resemblances between the Mongolian microliths and those of the Campus site should also not be overlooked in any consideration of the origins of Alaskan traditions. Aside



from Japan, the nearest microlithic complex to Bering Strait is that of the Asiatic steppe zone, where it flourished from about 3000 B.C. to 1500 B.C., accompanied by bifacial arrowpoints and (invariably) pottery; burins, however, are not common here (Chard 1959).

[3] Where text reads "pottery, slate, lamps and other continuities with Asia," delete *slate*. This was an American idea, with no antecedents in eastern Siberia.

By HENRY B. COLLINS\*

Giddings' grouping of the prehistoric cultures around Bering Strait into three regional patterns, and his views on the causative factors—diffusion, trade, and tradition—behind the patterns, provide a convenient background for discussion of culture development and interrelationships in the western Arctic.

First I would like to clarify a point regarding the nature of the cultural sequence at Gambell, St. Lawrence Island. The location of the five Gambell sites in relation to old beach lines provided preliminary rather than conclusive evidence of their relative ages. The Gambell sequence depended primarily on (1) stratigraphy (Old Bering Sea 1 underlying Old Bering Sea 2 at the Hillside site, and Old Bering Sea 2 and 3 underlying early Punuk at Miyowagh); (2) typology—a long series of developmental changes in art and numerous implement types from Old Bering Sea to modern times; and (3) the sudden appearance—as imports from Siberia—of many new implement types, including Thule forms, at the Punuk and later sites. In combination these several lines of evidence confirmed what was expected from the positions of the sites in relation to the old beaches.

The dominant theme of Giddings' paper is that stability, continuity, and local culture growth, rather than the migration of peoples or the diffusion of whole culture patterns, were the forces responsible for the development of the three cultural configurations around Bering Strait. Restricting attention for the moment to the "Asian" segment, we find this viewpoint expressed in three closely linked concepts: the Siberian rather than Alaskan affinities of St. Lawrence Island culture; the local origin of the cultures; and the necessity of recognizing Bering Strait as a culture center. No one could question the validity of these concepts; it is surprising, however, to see them presented as new approaches to the understanding of Bering Strait archaeology.

Except for Larsen and Rainey (1948), who brought the Ipiutak culture and its bearers from the lower Ob and Yenisey region in Siberia, I know of no American archaeologists working in the Arctic who have postulated an outside origin

for the Bering Strait cultures (in contradistinction to some of their elements); nor to my knowledge are there any who have not recognized the Siberian affinities and origin of St. Lawrence Island culture, or the obvious fact that Bering Strait was an important culture center. These views have been expressed repeatedly, and in my own case with what I feared was tiresome repetition.

From the statement (under "The Asian Sites") that, "The Asian affinities of St. Lawrence Island have been known, though seldom stressed, by the archeologists who have worked there," one would hardly suppose that these workers had expressed themselves as follows:

The close relation which has always been recognized between the St. Lawrence Island Eskimo and those of northeast Siberia is seen to have extended far back into the past. . . . The enormous and practically unknown stretch of coast from Indian Point northward to East Cape and thence westward to the Kolyma seems the most likely region in which to search for the beginnings of the ancient Bering Sea culture, which in its later stages produced in Alaska an Eskimo culture of unparalleled richness, gave rise to the highest Eskimo culture of the eastern regions, the Thule culture, and formed the basis of the existing culture of the Eskimo of Alaska and Siberia [Collins, H. B., *Prehistoric Art of the Alaskan Eskimo* (Smithsonian Miscellaneous Collections 81, No. 14 [1929]), p. 47].

On the whole it would seem that there was as close a relationship between St. Lawrence Island and northeastern Siberia during the Old Bering Sea and Punuk periods as there is at the present time. Direct influences from the Alaskan mainland, on the other hand, seem to have been negligible. . . . It seems fairly certain that just as at the present time, there was never any regular contact with the Alaskan mainland, the nearest point of which was more than 100 miles away, whereas there has apparently always been constant communication between the St. Lawrence Islanders and their neighbors in Siberia [Collins 1937a: 361].

It [Rudenko's work in northeastern Siberia] establishes the Okvik stage, first described from Punuk Island, as the earliest yet known in the Eskimo region of northeastern Siberia. It also demonstrates very clearly that St. Lawrence Island is archaeologically Siberia and emphasizes the strange dissimilarity in archaeological materials on the two sides of the Strait [Rainey, F., "The Significance of Recent Archaeological Discoveries in Inland Alaska," *Memoirs, Society for American Archaeology*, No. 9 (1953), p. 45].

By way of summary, we may say that the material available to us indicates that all the stages of development of the Bering Sea Eskimo culture complex are represented on the Asiatic mainland, and that the entire region on both sides of the strait has constituted a single culture area from very early times. However, the culture hearth seems to have centered on the Asiatic side in the oldest periods—especially if we include St. Lawrence Island as a part of Asia,

which it is geographically and evidently has always been culturally as well [Chard 1955: 168, summarizing the results of Rudenko's work].

Statements as to the importance of Bering Strait as a culture center and of the local origin of the cultures have been no less explicit:

The discovery of sites in which only Okvik style of engraving occurs (sites which cannot be recognized from the surface) suggests that still earlier deposits may possibly be found containing objects with a still more primitive style of engraving; and that eventually, this ancient form of Bering Sea art will appear as an autochthonous development within the western Eskimo area. . . . The center of development for this [Okvik] culture pattern now appears to be the Bering Straits region, and since the complex Old Bering Sea culture type, previously described as the oldest known stage of Eskimo culture in the western Arctic, is now seen to be derived from a somewhat simpler form (Okvik) in northern Bering Sea, there is some indication that the whole Arctic coast pattern may have originated in the Bering Straits region [Rainey 1941: 552, 565].

Indeed, the possibility cannot be excluded that in some instances elements of northern origin may have spread southward along the Asiatic littoral, for though northern Alaska is a marginal area geographically, it was also a center of vigorous culture development some 2,000 years ago. . . . The elements constituting the oldest Eskimo cultures are by no means all traceable to a remote Old World origin. The elaboration and complexity of the Old Bering Sea and Ipiutak show that Bering Strait was a region of high culture intensity. A peculiarly favorable environment—one of the great hunting territories of the world—fostered the richest and most vigorous development of culture that has ever appeared in the Arctic regions. Many of its elements, we know, were of local origin; and there is no reason to suppose that any large segments of the culture, for instance its unique and highly developed art complex, were brought in from some unknown outside source. It is the basic elements underlying the superstructure of local development with which we are concerned, and these are unmistakably of Old World origin [Collins, H. B., "Eskimo Archaeology and Its Bearing on the Problem of Man's Antiquity in America," *Proceedings of the American Philosophical Society* 86, No. 2 (1943), pp. 230, 231].

The oldest known Alaskan Eskimo cultures, instead of being simple, are already specialized and highly developed. As Bering Strait itself was an important culture center in prehistoric times the stages immediately antecedent to Ipiutak and Old Bering Sea will probably be found in the same region. . . . The final development and elaboration of Eskimo culture took place at Bering Strait, a region abounding in game—walrus, seals, caribou, birds, fish—and in every way more suitable for human occupation than the north coast of Siberia. For a people equipped to utilize the resources of the sea, Bering Strait was one of the richest hunting territories of the world. Considering this and the fact that it was also accessible to culture influences from the south, it is not surprising that Bering Strait became a center of high cultural development [Collins 1950: 435, 456].

Finally, we may cite Levin, who has given particularly serious and thoughtful attention to all of the evidence, physical and cultural, bearing on the origin and relationships of the peoples of northeastern Asia, including the Eskimos:

Summarizing the above, we have to recognize as unfounded the theories of Eskimo origin as a result of migrations which had brought to the Bering Sea an economic and cultural complex, found somewhere outside that territory. The development of the Eskimos—their culture and language—was undoubtedly the result of prolonged and complicated processes, in the regions bordering on the Bering Sea. In these processes, apparently, no small part was played by the ties of the ancient population of the Bering Sea area with that of neighboring and more distant territories; however, these ties did not interrupt the continuity of culture (and apparently of language) in the Bering Sea region, which must be looked upon as the “Eskimo homeland” [Levin, M. G., *Ethnical Anthropology and Problems of the Ethnogenesis of the Peoples of the Far East* (Academia Nauk SSSR, Institute of Ethnography, Trudy, n.s., 36 [1958]), p. 246; In Russian].

#### Okvik

Giddings is very likely correct in suggesting that the Okvik site on Punuk Island, which includes artifacts decorated with deep, heavy engraved lines, is somewhat older than the Gambell site, which was characterized by a more delicate style of engraving. However, I think it probable that the Punuk Island site itself includes materials—or at least art styles—of somewhat different age. From Rainey's (1941) illustrations it is possible to recognize three more or less distinct sub-styles of Okvik art. The first, which I will call *A*, was a crude, bold decoration consisting of thick, deeply cut lines to which long slanting spurs were attached. This style of engraving was applied mostly to thick heavy harpoon heads which were almost square in cross section and which had multi-pronged asymmetrical basal spurs (Rainey 1941:478, 482, Figs. 5, 7). The second sub-style, *B*, was a delicate fine-line ornamentation which, as Rainey points out, was applied with equal consistency to two other types of open and closed socket harpoon heads which were unusually thin in cross section (Rainey 1941:476, 480, Figs. 4, 6). This style was characterized by lightly incised straight, rather short, slanting lines which often converged to form tent-like figures, and by longer lines, single or double, with tiny triangular spurs attached. The third and most elaborate of the Okvik sub-styles, *C*, consisted of a profusion of straight, lightly incised single and double lines to which were attached small triangular spurs, carefully spaced, often in pairs (Rainey 1941: Figs. 12, 12; 17, 3; 21, 6; 35, 5; Collins 1937a: Fig. 8). Associated with this style were

nucleated circles, single and concentric. The lines themselves were usually arranged in converging fashion with a small nucleated circle at the apex. The design is an elaboration of the simpler tent-like figure of the second Okvik style, *B*, which consisted of two spurless lines converging toward a single center line. The design, as it occurs in style *C*, closely links Okvik with the succeeding Old Bering Sea style 2, and it continues in varying form as a basic element of later Old Bering Sea (hereinafter OBS) and Punuk art.

Most of the decorated objects illustrated by Rainey do not fall precisely into any of the three Okvik sub-styles I have mentioned. The engraving is simpler and more casual and the designs less organized. They consist, however, of the same basic Okvik elements: spurred lines in a wide variety of forms; short detached lines, often in pairs; broken or dotted lines; radiating or converging lines; long, sharp spurs—pairs of converging lines—attached to small nucleated circles; and various kinds of circles and ellipses. While Okvik art in some ways is simpler than OBS styles 2 and 3, it is also more fluid and variable, and future work may well reveal an age difference between the three Okvik sub-styles, with *A* the oldest, and *C*, which shows the closest approach to OBS style 2, the latest.

The second and third styles—*B* and *C*—are presumably to be equated with Giddings' Okvik II, the undescribed material from his round house at the Gambell Hillside site. Okvik II is considered to be “intermediate between the typical Okvik [i.e., Punuk Island Okvik] and the Old Bering Sea Style I artifacts previously mentioned for the Gambell Hillside.” According to this interpretation OBS style 1 is separated from Okvik and restricted as a type designation to the few decorated objects which I described by that name from the two Hillside houses at Gambell (Collins 1937a:40–47, 91). I do not know of any grounds on which such a distinction could be made; the OBS style 1 material from Gambell is no closer to later OBS than is the Okvik material from Punuk Island. The principal difference between Punuk Island Okvik and what I described as OBS style 1 is that the latter lacks the elaborate, closely spaced, spurred line decoration which I have here called Okvik sub-style *C*. However, this may well have been accidental, considering that only half a dozen examples of this particular style were found among the hundreds of decorated objects from the Okvik site on Punuk Island. On the other hand, the few Hillside pieces did exhibit such characteristic Okvik motifs as converging or radiating lines, long heavy spurs

attached to lines, broken lines, spurred lines, pairs of short detached lines, long sharp spurs appended to small circles, and nucleated spurred circles. The decorative scheme as a whole on two of the Hillside objects (Collins 1937a: Figs. 4, 5, pp. 42, 44) is virtually identical with two from the Okvik site (Rainey 1941: Fig. 26, 3a; Fig. 36, 7). In addition to these close resemblances in art, most of the Hillside implements are types also found at Okvik, including such highly diagnostic Okvik elements as heart-shaped flaking hammers, the peculiar form of carved human figure, and the small highly specialized form of ivory winged object (Collins 1937a: Pl. 12, 1, 3, 5, 6, 7; Pl. 30, 18–20). “Okvik” is a convenient and proper designation for all of this material as it was first found in isolation at the Okvik site. However, it seems well to retain the synonymous term, OBS style 1, as a reminder of its close linkage with OBS style 2. As this seems not to have been generally recognized, it might be pointed out that OBS style 2 and Okvik, particularly sub-style *C*, employed the same design elements: spurred, double, and broken lines, concentric circles, and circles set between converging lines. Several types of harpoon heads, elaborate and complicated in form, are sometimes decorated in Okvik style and sometimes in OBS style 2. Also, in some cases the designs are so blended that it is difficult to say whether they are Okvik or style 2.

As Giddings remarks, the Uelen site at East Cape, Siberia, excavated by Rudenko, appears to be mostly Okvik I. This is indicated by the principal harpoon head type, which is the thick heavy form with deep-line engraving (sub-type *A*). Accompanying these are several Birnirk and Old Bering Sea harpoon heads and a bear figure with OBS style 2 engraving (Rudenko 1947: Pl. 1, 1–3, 14, 24; Pl. 4, 8, 10; Chard 1955: Figs. 9, 10, 53). Rudenko, according to Chard's summary (1955:159), considers Uelen to be older than the Okvik site on Punuk Island because the latter contained a number of typical Punuk culture artifacts. These, however, are undoubtedly intrusive. The Okvik material described by Rainey included a large collection of artifacts purchased from Eskimos in 1931, the year the site was discovered (Rainey 1941:465, 474). A ten- to twelve-foot-high Punuk culture midden, one of the largest and richest in the Arctic, lies only a few hundred yards from the Okvik site. The several boat loads of Eskimos who dug on the Island, unsupervised, in 1931, would inevitably have included material from this site in their collection. If we disregard this intrusive Punuk material, the Okvik site would seem to be “purer” than the Uelen site, which contained several Old

Bering Sea and Birnirk types. These, however, might also have been intrusive. If so, there would be no reason to question Rudenko's conclusion that Uelen is the oldest Okvik site thus far discovered. Priority for the Uelen site is suggested not only by the harpoon heads, which on typological grounds seem the oldest Okvik type, but also by the absence of pottery, the almost complete absence of rubbed slate blades, and the presence of a peculiar type of arrowhead, slotted at both ends, like those from Bronze Age sites in Siberia, Ipiutak, and the pre-Eskimo Trail Creek cave on Seward Peninsula, Alaska.

#### *The Asian, Bering Sea, and Chukchi Sea Sites*

Giddings' three regional culture sequences are as exact and complete as the archaeological evidence and radiocarbon dating warrant. In most respects Giddings' chronology is in close agreement with mine (Collins, H. B., "Archaeological Research in the North American Arctic," *Arctic* 7, Nos. 3-4 [1954], pp. 300), the principal difference being that Giddings, with additional radiocarbon dates available, has Denbigh somewhat later and Norton somewhat earlier. The question is whether the data warrant this threefold segmentation of culture at Bering Strait, whether there was in fact so sharp a demarcation, with three geographical culture patterns arising and continuing through time, each within its own confines, largely independent of the others. In a general way the reconstruction holds, provided some important exceptions are noted. Okvik-Old Bering Sea sites are restricted to the Siberian coast, St. Lawrence and the Diomed Islands; Okvik-OBS features—art and implement types—are not so restricted, and it cannot be assumed that their presence on the Alaskan mainland is an indication of nothing more than trade. Following Okvik-OBS in time are Birnirk and Punuk, and at Cape Prince of Wales a blend that is recognized as Thule-Punuk, an outgrowth of Birnirk. Wales is on the Alaskan mainland. Is it to be listed among the "Asian Sites" because its culture was derived from earlier stages in Siberia? And if so, how are we to label the countless Thule culture sites in Canada and Greenland? In the case of Birnirk the difficulty is more than one of terminology. Birnirk sites are known not only from around Point Barrow, but also at two localities—Chetyrekhshtolbovyi Island and Cape Baranov—near the Kolyma River on the Arctic coast of Siberia (Chard 1955:152, 154). Is Birnirk, then, an Asian or an American culture? Of necessity Giddings places it,

and also Thule, in both categories, thereby considerably blurring the picture of "three distinct Bering Strait cultural areas," in each of which a different pattern of culture arose and ran its independent course. It is too early to say definitely whether the Birnirk culture originated in Siberia or Alaska. The former, it seems to me, is far more likely, in view of the presence of Birnirk material at numerous Siberian sites and the abundance of related earlier cultural remains—Okvik-OBS—in the same region. If this is so, Giddings' conclusion (under "Bering Sea") that "the sequences of Asia do not repeat themselves on the American side" would require modification.

Giddings recognizes that the Norton culture of the "Bering Sea" division is closely allied to the Near-Ipiutak and Choris cultures of the "Chukchi Sea" division and to South Alaskan Eskimo-Aleut culture. This, however, is not the only cross-tie between the Bering Sea and two other divisions. Giddings' recent work suggests that the Denbigh Flint complex also existed around Kotzebue Sound, and so it is placed as the basic culture stratum in both the Bering Sea and Chukchi Sea divisions. It also existed in closely related form in the Brooks Range in interior Alaska. Nukleet I, which succeeded the Norton culture at Cape Denbigh, is "Neo-Eskimo," with closest resemblances to Early Punuk and Thule-Punuk, stages of "Asian" culture, while Nukleet II and III are closest to Western Thule of the Chukchi Sea "American" division. Lying at the forest edge, Nukleet as might be expected contains a few inland traits such as beavertooth knives and birch-bark containers. Basically and preponderantly, however, the oldest material at Nukleet is so close to Thule-Punuk that the site might be regarded as a southern extension, from the Bering Strait region, of that typically "Asian" culture—a situation not covered by the statement (under "Bering Sea") that, "The cultures of the northern Bering Sea region give no sign of having originated directly, in any period, from the Old World side of the Strait."

That such contradictions can occur would seem sufficient reason for questioning the usefulness of a reconstruction which defines its culture sequences primarily in geographical terms, and which postulates a fixity and relative isolation of culture within narrowly circumscribed geographical limits, especially when, as in this case, the geographical units are contiguous small sub-regions of one larger region.

#### *Diffusion vs. Trade*

Trade between Alaska and Siberia was an important factor in Eskimo-Chukchi economy in the nineteenth century and, as Giddings says, probably also in earlier times. It should be noted, however, that except for iron knives, lances, kettles, and glass beads, which the Eskimos were eager to obtain from the Chukchi, this intercontinental trade was mainly in raw materials—skins and furs, rawhide lines, walrus ivory, tobacco, oil, food products, etc. Each side received what it needed—materials and commodities that were unavailable locally. Trade in manufactured goods was limited mainly to wooden vessels, boots and parkas, and, farther to the east, soapstone lamps and cooking pots. Not included, apparently, were the harpoon heads and many other tools and implements which each tribe made for its own use according to its own standards and preferences. Stefansson (1914b:26), describing the materials that were traded, remarks on this point: "I have found it characteristic of Eskimo generally (and especially of those west of Cape Parry) that each tribe believes the artifacts made by its own members to be superior to the corresponding articles made by outsiders." Here on the Arctic coast of Alaska and Canada, just as around Bering Strait, trade was mostly in local materials which varied according to the natural resources of the particular region, principally wood, copper, soapstone, muskox horn, and sometimes objects made from these. The same pattern held for the intensive trade between the coast and inland Eskimos of northern Alaska. The wide variety of natural products and materials involved in this trade, described by Spencer, did not normally include tools and weapons: "Each man was expected to be able to manufacture his own tools and weapons for himself and for his dependent family members" (Spencer, R. F., *The North Alaskan Eskimo. A Study in Ecology and Society* [Bureau of American Ethnology, Bull. 171 (1959), p. 205]). The fact that harpoon heads and decorated objects are not known to have been traded in historic times raises the question of their value as evidence of prehistoric trade.

The Birnirk style harpoon heads on St. Lawrence Island mentioned by Giddings may safely be regarded as imports, whether by trade or otherwise, for they differ in form from the local types and are made of antler, though caribou have never lived on the Island. Also, the whetstone of Kobuk River jade found at Kukulik, St. Lawrence Island, is obvi-



ously intrusive. The Birnirk harpoon heads found at two sites on the Arctic coast of Siberia seem to require a different explanation. Instead of appearing out of context, they are the dominant types, far outnumbering any others at these sites (Chard 1955:152, 154). This would seem to mean that the Birnirk existed as a cultural entity in northern Siberia. The same explanation would apply to the Thule harpoon heads of identical form found at Asian and American sites which Giddings cites as evidence of trade. I would say they are similar because they are the products of a Thule culture which existed on both sides of Bering Strait.

The Punuk harpoon heads which occur as "rare items" in Kotzebue Sound sites are evidently those at Ahteut on the Kobuk River (Giddings 1952a:56). However, it should be noted that these and a Thule type 2 head were the only harpoon heads found at the site, which speaks against their being trade pieces. These harpoon heads do not appear to be out of place at Ahteut except that, being designed for sea mammal hunting, they are 100 miles inland from the sea. Most of the other Ahteut artifacts (fish-shaped fishing lure; fish net sinkers; fish spears and arrows; bola weights; conical-tanged arrowheads; harpoon socket pieces and ice picks; harpoon dart heads; composite knife handles; rubbed slate blades for knives, ulus and harpoon heads; adz heads, handles and blades; cannon bone scrapers; amber; pyrites; splitting wedges; whetstones; whale rib mattocks; baleen bucket or pail; and pottery lamps and cooking pots decorated with paddled curvilinear Birnirk designs) are just as characteristic of contemporaneous or somewhat older coastal Eskimo sites as are the harpoon heads. The same is true of later Kobuk River culture. The 19 harpoon heads from the later sites on the middle and lower Kobuk are identical with those found at late Thule sites from Alaska to Greenland. But again this is in no way exceptional, and cannot be accepted offhand as specific evidence of trade, for the other implement types—65 by count—that form the great bulk of late prehistoric Kobuk culture are those which regularly occur at coastal sites of the same age in northern Alaska. Rather than trade involving a few selected categories of artifacts such as harpoon heads, I would suggest that the explanation is one of wider cultural significance, namely, the inland movement of Eskimos who, long familiar with caribou hunting and fishing nearer the coasts, chose to extend their settlements far up river where they could devote themselves primarily to these pursuits. The harpoon heads in their possession suggest that the Ahteut and other Ko-

buk Eskimos made seasonal excursions to the coast or as far downstream as necessary in order to hunt seals (Giddings 1952a:56). No doubt there was also trading between the river and coast dwellers, just as today, but if present custom prevailed, the sea products transported up river would have been mainly seal oil, blubber, seal skins, etc., of which there would be no archaeological trace.

The Okvik harpoon head found in an Ipiutak house is no doubt an import, for it is a characteristic Okvik type that does not belong in the Ipiutak culture; moreover, the decoration is specifically Okvik. Four side prongs for bird darts and a harpoon socket piece with similar decoration (Larsen and Rainey 1948: Fig. 47) are also probably intrusive at Ipiutak. It does not follow, however, that they are necessarily the result of direct trade. In fact they could hardly be so regarded if, as Giddings and I both believe, Ipiutak is some centuries later than Okvik. Also to be noted in this connection is the fact that diagnostic Ipiutak artifacts have not been found at Okvik-OBS sites. In speaking of Okvik art at Ipiutak, it should be mentioned that Ipiutak art itself incorporates Okvik and OBS motifs and as a whole "is closely related to the characteristic curvilinear style of the Okvik and Old Bering Sea phases" (Larsen and Rainey 1948:143-44). Thus, to cite only two examples, an ivory band (Larsen and Rainey 1948: Fig. 38, a) has an over-all decoration that is Ipiutak, though the spurred lines forming part of the design are specifically Okvik and the concentric circles are common to Ipiutak, Okvik and OBS style 2; a companion piece with generally similar decoration (Fig. 38, b) has Okvik spurred lines, a few specific Ipiutak motifs, and a design arrangement that is close to OBS style 2. Whatever the explanation of the presence of a few actual Okvik artifacts at Ipiutak, they are of less importance culturally and historically than are the many other artifacts and art designs which show that the two cultures were closely related in some respects, however different they were in others.

While Giddings emphasizes the importance of trade, he also recognizes that, "Many other close resemblances on all time levels may result from imitation rather than trade." I suggest that, except as noted above, the close resemblances that have been mentioned are due neither to imitation in the strict sense nor to trade, but to the retention of earlier culture traits (Okvik-OBS) by a somewhat later culture (Ipiutak), to a basic and unexplained kinship in some respects between Ipiutak and Okvik-OBS, and, in the case of the Bir-

nirk and various Thule stages, to a commonality of culture that existed during these periods as attested by the same types of harpoon heads and many other implements at sites of the same age in northern Alaska, including the Kobuk, at Bering Strait, Norton Sound, and probably the Arctic coast of Siberia as far west as the Kolyma River.

#### *Migration and Origins*

One can recognize the importance of cultural stability, local culture growth and the regional patterning of culture in the Bering Strait area without contending, as does Giddings, that population movements were in no way involved. For example, Nukleet I seems to have been completely unrelated to the earlier Norton culture of the same locality but closely related to Thule-Punuk of Bering Strait. The most logical explanation would seem to be that it was brought to Cape Denbigh from the Bering Strait region by Eskimos who possessed a Thule-Punuk form of culture. I would also assume that population movements, probably on a small scale, were responsible for the establishment of the Birnirk culture along the Arctic coasts of Siberia and Alaska, and I would not be surprised if the same should prove to be true in the case of the Near Ipiutak of Arctic Alaska and the Norton culture of Norton Sound.

As long as attention is focused on Bering Strait, there is no need to invoke large-scale migrations of peoples or the transference of total cultural patterns into the area, for this was the area in which the cultures developed. But Bering Strait is only part of the Eskimo world, and if we look to the east it is evident that migration and culture transfer must be taken into account. In no other way can the rapid spread of the Thule culture throughout Canada and Greenland be explained. The Thule Eskimos who moved eastward with their Alaska-derived culture need not be regarded as "weary migrants" or "determined plodders"; rather, they were expert travelers, who traversed the enormous stretch of territory from North Alaska to North Greenland in a remarkably short time. This seems the only way to account for the virtual identity of the oldest Thule materials in Alaska, northern Canada, and Greenland. Similar contacts and intercommunication seem necessary to explain the many other close resemblances between later stages of Thule culture in Canada and Greenland and those of the same age in Alaska. It is surely no accident that this part of the Arctic, where a uniform pattern of Thule culture extended for over 6,000 miles, is an area in which a single language is spoken. This remarkable linguistic homoge-

neity, perhaps unparalleled elsewhere, implies relatively recent population movements and contacts—later, it would seem, than the original eastward spread of the Thule culture around 1,000 years ago (Collins, H. B., "Comment" in "Time Depths of American Linguistic Groupings: Symposium," *American Anthropologist* [1954] 56). If the specific data of archaeology are examined, part of the explanation may be found in the postulated late westward movement or movements of Thule Eskimos which brought a number of typical Thule traits to northern Alaska within the past few centuries, traits which are characteristic of prehistoric Canadian Thule culture but which in Alaska are restricted to sites of the historic period and the protohistoric period exclusively.

The origins of the Thule and Punuk cultures seem relatively clear; for the most part both were outgrowths of earlier cultures which preceded them in the same region. It is different with the earlier cultures themselves. It has long been apparent that these too, in the form in which we know them, developed locally, in the Bering Strait region. But is the recognition of this more than a step, a long step to be sure, toward the final solution? The specific complexes which we call Okvik, Ipiutak, Dorset, Denbigh, or any other, are comprised of a number of discrete elements which appear in particular combinations. The component elements of a culture, unlike the assemblages which they form, may in some cases be traced far back into the past and to regions far from where the complex arose. It should not be considered mere speculation, but one of the legitimate and necessary tasks of archaeology, to observe the distribution in time and space of the individual elements in an attempt to discern the basic roots of the culture. Giddings' discussion of the Denbigh Flint complex points up the distinction between the origin of a total complex and of the elements of which it is composed. As the Denbigh Flint complex (like any other complex) is unique, and well established in Alaska, there is no need to seek its origin elsewhere. However, its three most important elements—burins, microblades, and side blades—must have been derived from the Old World, unless one were prepared to believe that these distinctive Palaeolithic and Mesolithic features were independently invented in America. Therefore the ultimate origin of the Denbigh Flint complex, from the history of its constituent elements, may be said to lie in the Old World, although as Giddings points out, the complex itself has not been identified anywhere outside of Alaska.

### Tradition

It was perhaps inevitable that the concept of tradition would be extended to the Arctic, for in few other areas has tradition in the ordinary sense been more persistent, and tradition-bound cultural configurations more apparent. Giddings has described "three zones of archeological tradition" around Bering Strait, which will be useful in distinguishing between the several contrasting patterns of culture revealed by archaeology in this particular, rather limited area. It should be noted, however, that some of these are only segments, regional manifestations, of larger traditions that extended far beyond Bering Strait. If the concept is to be formally adopted and defined in anything like the way it has been in other parts of America, it would seem desirable to begin on a broader scale by recognizing first the major traditions that existed in the Arctic area as a whole and in other parts of the area.

The best known and most sharply defined Arctic tradition is the Okvik—Old Bering Sea—Birnik—Punuk—Thule—Inugsuk sequence, a cultural continuum which originated in Northeast Siberia over 2,000 years ago and spread eastward to become the principal basis of modern Eskimo culture in northern Alaska, Greenland, and parts of Canada. It is a tradition in the truest sense, as has long been recognized, a series of related cultures or stages, which reveal often in minute detail the growth processes of a configuration which has persisted for over 2,000 years within a sharply circumscribed but extensive geographical area—the whole of Arctic America and adjacent northeastern Siberia. This coastal Arctic tradition corresponds to the "Neo-Eskimo" or "Arctic Whale Hunting Culture" of Larsen and Rainey. I have pointed out elsewhere (Collins, H. B., *Arctic Area* [Program of the History of America, No. 68 (Mexico: Comision de Historia)], pp. 80–85) the objections that may be raised to the use of these and the companion terms Paleo-Eskimo or Ipiutak complex, and to the contradictions and inconsistencies that result when Eskimo cultural relationships are interpreted under the postulates of this hypothesis. This is not surprising, considering that in Larsen and Rainey's highly elaborate theoretical structure the archaeological data—the various stages of prehistoric Eskimo actually discovered—were made to conform to the suppositions of Birket-Smith's and Steensby's rigid and elaborate ethnological-geographical hypothesis, no part of which has been sustained

by the evidence of archaeology, somatology, or linguistics.

By whatever name it may be called, the Okvik—Inugsuk tradition (to telescope its stages) was essentially that of a maritime hunting people who lived in permanent villages along the sea coasts, and, in northern Alaska, along the larger rivers in the adjacent interior. On the islands of the Bering Strait region where there were no caribou, food and other necessities of life came mainly from the sea—seals, walrus, whales, polar bears, fish and sea birds; whales were hunted only rarely during the earlier periods but intensively in the Punuk, Thule, and later stages. Wild-reindeer hunting was an important occupation on the Siberian mainland in the Okvik period; on the American mainland and in Greenland, caribou as well as muskox were hunted at all times when they were available. Implement technology was highly developed, and varied from period to period as new types evolved or were introduced and others disappeared. The persistence of tradition is indicated by the presence in all periods of such features as the semi-subterranean house with entrance passage; the toggle harpoon with its several parts—detachable head and foreshaft, fixed socket piece and shaft, finger rest, ice pick; inflated seal skin floats; throwing board; bird darts with side prongs; bow and arrow, the latter with separate bone or ivory head with or without stone blade; skin boats; sleds—first the small hand sled for hauling boats over the ice, later the dog sled; baleen toboggans; chipped stone and rubbed slate implements, the former more important in the early periods; lamps and cooking pots, first of pottery, later of stone; adzes; mattocks; bow drills; ulus and mens' knives; knife with composite handle and small end blade which functioned as a burin; tambourine type drum; snow goggles; needle cases; brow bands; link ornaments, ivory and wooden dolls.

In the central and eastern Arctic these features made their first appearance in the Thule period. At Bering Strait the way of life which they denote has continued without break from Okvik times to the present. This is shown most strikingly by the village on Little Diomed Island, which was established in the Okvik period, was occupied throughout the succeeding periods, and is still inhabited today. The strength and tenacity of the tradition is indicated also by the marked changes it underwent and by the new features it was able to absorb. Thus, on St. Lawrence Island many new elements appeared in

the Punuk stage, apparently not as the result of borrowing or diffusion but brought there by new migrants from Siberia. This is suggested by the skeletal remains—the long headed, specialized northern Eskimo or Birnirk type at Old Bering Sea sites, and the sudden appearance at Punuk sites of the broader headed modern St. Lawrence and Siberian type. Similarly, the features which Giddings lists as typical of the Asian tradition are probably typical only of its latest phase, when it was subjected to strong Chukchi influence. These particular features are not of a kind that can be demonstrated archaeologically, but it seems probable that they were associated with a group of important implement types, 17 in number (Collins 1937:255), which have not been found at any of the prehistoric St. Lawrence sites but which, like those Giddings mentions, are typical of modern St. Lawrence Island culture. These, like the new features introduced on St. Lawrence in the Punuk stage, were no doubt brought to the Island by Eskimos who moved over from the Siberian mainland. That the tradition could maintain its essential character under such circumstances is a better measure of its vitality than if there had been, as Giddings says, "only slow change in artifact style and a gradual loss of the art of engraving" over a period of 2,000 years.

The second major tradition in the Arctic was the Dorset and the earlier stages, as yet not clearly defined, from which it developed. The Dorset culture was deep-rooted in the eastern Canadian Arctic and Greenland. Radiocarbon dates for an early stage of the culture at the T 1 site on Southampton Island range from 675 B.C. to 103 B.C.; these compare with dates of 2000 B.C. to 396 B.C. for the early and late stages, respectively, of the Sarqaa culture, which seems to have been the stage immediately ancestral to Dorset (Rainey and Ralph 1959; Collins 1956). There are no radiocarbon dates for the terminal stages of Dorset, but it was still in existence when the Thule people arrived in Arctic Canada around 800 years ago, and it may well have persisted in some areas considerably later than that. The extent to which Dorset and Thule may have influenced one another remains to be determined. It would also be expected that the Dorset culture, which had persisted for so long in the central and eastern Arctic, would have left some imprint on the modern culture of these regions. Thus far we can point only to the modern central Eskimo type of harpoon head and side-bladed lance as forms that were derived from the Dorset culture.

In general, Dorset and Thule were about as different as two Eskimo cul-

tures could be. This was not because of any fundamental differences in economy. Both were hunting people, depending for their livelihood on the sea and land animals around them, though the Dorsets did not hunt whales or possess dogs. The sharp differences between Dorset and Thule show up mainly in their implement typology, entirely different forms of implements having been used to perform the same function. Also, the Dorset people lacked such typical Eskimo features as the bow drill, ulus, the throwing board, bone arrowheads, mattocks, snow shovels, and dog sleds. Their harpoon heads, knives and other bone and ivory implements were small and delicately made, in keeping with their stone technology which may be described as microlithic. The latter provides the clue to the origin of the culture. The burins, burin spalls, microblades, round, oval and rectangular side blades, and small end blades of the early Dorset culture are directly comparable to those occurring at much earlier pre-Eskimo sites to the west in Canada and Alaska, sites which in one way or another are related to the microlithic Denbigh Flint complex of Norton Sound. Though all of these early Dorset features have not been found together at any one of the western sites, their consistent occurrence in varying combinations at all of them points to the Denbigh Flint complex, or related complexes, as the principal source from which the Dorset tradition arose (Collins, H. B., "Recent Developments in the Dorset Culture Area" [*Memoirs, Society for American Archaeology*, No. 9 (1953)]; Collins, "Archaeological Research in the North American Arctic"; Harp, Elmer, Jr., "New World Affinities of Cape Dorset Culture" [*Anthropological Papers of the University of Alaska* 1, No. 2 (1953)]; Irving, William, "Evidence of Early Tundra Cultures in Northern Alaska" [*Anthropological Papers of the University of Alaska* 1, No. 2 (1953)]).

The third major Eskimo tradition is that centering in south Alaska, in what De Laguna (1956) has called the Pacific Eskimo-Aleut province. Features which give a distinctive stamp to the prehistoric and modern culture of the Aleuts, Koniag, and Chugach include oval and round stone lamps, whaling with poisoned lance, the detachable barbed head with hole in tang more important than the toggle harpoon head, composite fish hooks and stone sinkers, specialized forms of slate blades, emphasis on decoration of clothing and the person, high development of woodworking, painting, and especially of weaving.

The three contrasting patterns of Eskimo culture—the northern maritime, Dorset, and Pacific Eskimo-Aleut—

which I have referred to as "traditions" have, of course, long been recognized as such, and the use of this particular term brings no new insight or understanding. I only wish to suggest, if the concept is to be applied at all to the Arctic, that these three distinctive configurations be recognized as the major traditions of the area.

Returning to Bering Strait, we see that two distinct traditions may be recognized there, which though partly overlapping in geographic range, moved in different directions at different times in the past. The northern maritime tradition, which had developed in northeastern Siberia, spread north from Bering Strait to Point Barrow, then over two thousand miles eastward to Greenland, with only a minor offshoot—Nukleet—extending south of Bering Strait. The other and older tradition—Choris—Near Ipiutak—Norton—which is just beginning to emerge from Giddings' work, had a north-south alignment, from Point Hope to Kotzebue Sound to Norton Sound, and possibly as far south as the North Pacific—Aleutian area. The direction of the flow is uncertain but a clue is provided by the presence of the Denbigh Flint complex in the Norton-Kotzebue Sound area. I have suggested above that this basic west Alaskan culture contributed to the formation of the Dorset, the dominant Eskimo culture of the eastern Arctic. In all probability the Denbigh complex or a related later stage was also the source from which the stone industry of the Ipiutak culture was derived (Giddings 1951; Collins, "Archaeological Research in the North American Arctic"). Giddings now suggests that the 3,000-year-old Choris culture may also have developed from a Denbigh Flint complex base. Fortunately, Giddings has hit on a method of field operation that promises to provide the answers to many of these problems. His investigation of old beach ridges, along which cultural remains of different periods extend in ordered array back from the sea, has already yielded highly important results, and may later provide us with local sequences that will tie in Eskimo with pre-Eskimo and reveal the processes through which the Eskimo pattern of culture developed.

By DAVID M. HOPKINS\*

I gather that I am invited to contribute some discussion or amplification of the ideas presented in Giddings' paper, from the point of view of a geologist concerned with the Pleistocene and Recent history of the Bering Strait area. Unfortunately, I cannot at the moment devote adequate time or thought to such a contribution. I can say that during the time span covered by these cultural sequences (the last 4,000–6,000 years),



the landscape along the Bering-Chukchi coast has differed little from its present aspect. Sea level has varied little if at all from its present position. Studies of pollen profiles in several places indicate only minor changes in the climate and vegetation, and close study of the stratigraphy of soils and alluvium indicates that only minor fluctuations of climate are recorded. The earliest cultures in the region probably existed during the period that is known as the "climatic optimum" or "thermal maximum" in other parts of the world, but the thermal maximum seems to have been only an obscure and minor climatic event in the Bering-Chukchi region.

By HELGE LARSEN\*

My most important comment on Giddings' article is that it is an excellent outline of our present knowledge of the archaeology of the region in question.

[1] There are, however, two places where I would have expressed myself differently. The first place is where Giddings talks about "the firmly established St. Lawrence Island archeology." In my opinion, more excavations are needed on St. Lawrence and the Punuk Islands before we can be sure that the culture sequence is firmly established. The latest carbon-14 dates (Rainey and Ralph 1959) do not tally with those given by Giddings, and this raises the question which of the two cultures, Okvik or Old Bering Sea, is the older. Although it seems to me from a typological point of view that the old sequence (Okvik—Old Bering Sea) is the more likely, this needs to be confirmed through excavations. Further, the development of the Okvik culture is in my opinion not yet fully elucidated. In his paper, Giddings distinguishes between an earlier stage (Okvik I) and a later (Okvik II). However, the question is if there are not three, instead of two, as there are three different styles of decoration in the type site, viz., a coarse, a fine with straight or slightly curved lines, and a more elaborate characterized by spurred double-lines. The disturbing fact is that all three occur in the type site that Giddings uses as an example of Okvik I. Finally, no pure Old Bering Sea site has so far been excavated. I would like to see the expression "firmly established" changed, so that someone could be encouraged to do more digging on St. Lawrence Island and the Punuk Islands.

[2] The second place is where Giddings is "dubious" about the cultural continuity of the "Norton culture" with the Eskimo, and in a note questions "whether the primarily linguistic label 'Eskimo' should be applied to any of the inland-directed and older cultures

of the general region." It is of course true that we do not know if the Norton and Ipiutak people spoke Eskimo, but their cultures, and particularly the Ipiutak culture, contain so many and such significant culture elements characteristic of Eskimo culture that it is hard to call them anything but Eskimo cultures. As pointed out in the Ipiutak report (Larsen and Rainey 1948) and in a later article by me ("The Material Culture of the Nunamiut and Its Relation to Other Forms of Eskimo Culture in Northern Alaska," *Proceedings of the Thirty-Second International Congress of Americanists, Copenhagen, 1956*), the later inland-directed cultures of northern Alaska, including Seward Peninsula with the exception of Wales, developed out of the Ipiutak culture. The culture today is undeniably an Eskimo culture, since its bearers speak Eskimo, and yet for the last century the mode of life, the economy, and the types of dwellings of these inland people have been as different from those of the whale-hunting coast dwellers as the Ipiutak culture was from the cultures on St. Lawrence Island. The "coastal-inland dichotomy" is recognized by Giddings for later cultures (Western Thule—Arctic Woodland), and I do not see why he hesitates to stretch the line from the inland-directed cultures back to the Ipiutak culture, particularly since in the latter we find the same characteristics, viz., the extensive use of birch bark and beaver-tooth whittling. Considering the great similarity in the flint industry between Ipiutak and Near Ipiutak, on one hand, and Norton, on the other, there is hardly any doubt that the artifacts made of organic material were also similar.

By M. G. LEVIN\*

Giddings' article on the Bering Strait region is a very interesting, valuable, and pithy compendium of archaeological researches in this field, by one of the greatest experts on the subject.

The chronological chart in the article, though it contains some disputable elements, still seems to be sufficiently reasoned. One of the main problems of old Eskimo archaeology of the Bering Strait area is surely that of dating Okvik culture and correlating it with Old Bering Sea culture. It is unfortunate that the data on Okvik culture are still incompletely published.

[1] While materials from the coastal parts of Chukotka Peninsula are also incomplete, S. I. Rudenko, who conducted archaeological investigations there, is well known to have described

an ancient settlement site in Uelen. Concluding that the Uelen finds were similar to implements of the Okvik site, he distinguishes a special Uelen-Okvik stage—in his opinion the most ancient Eskimo culture in the Bering Sea area. The evidence for this statement still deserves further argumentation.

[2] Giddings mentions the excavations in Uelen by R. V. Chubarova and me. These excavations took place not at the Uelen site investigated by Rudenko, but at an ancient sepulchre situated some hundreds of meters away from the Uelen site. This cemetery was used as a burying place for a long time, but it seems never to have been used by the population of the Uelen settlement site. In 1955–59 about a hundred tombs were opened, and have yielded a vast amount of material. The majority of the tombs were marked by implements of the Old Bering Sea culture type, but some burials also contained typical Okvik, Birnirk, and Punuk implements (harpoon heads). These materials are now under study, but even now we can say that they indicate a rather unexpected co-existence of different types of harpoon heads in single burials.

[3] I consider very fruitful the general theoretical statements of Giddings, particularly his statement on the great significance of exchange in the life of various ancient population groups in the Bering Sea area. The author is right in insisting on the necessity to take into account this factor while comparing different local cultures. Undoubtedly true also is his statement that the similarity of certain elements in cultural complexes of different territories, significant as it might be, does not supply a ground for judging about migrations. How often we find people speculating about migrations instead of thoroughly investigating the possibility of local evolution and local changes of forms. Moreover, how often migrations and diffusion are sought, whereas similarities are really explainable by the similar level of evolution of different groups.

Giddings has shown a continuity of evolution of cultures on St. Lawrence Island. Very convincing is his statement that no culture of Bering Strait can be proved to have originated from some other region (his conclusion 3). In my book published in 1958 [see quotation in Collins' comment above, p. 132], I summarized all the anthropological, archaeological and linguistic data at my disposal and criticized theories considering the Eskimo to be late newcomers to Bering Sea areas. Acquaintance with Giddings' article has affirmed me in my position.

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# Recent Research on the Prehistory of Spain

by L. Pericot-Garcia and E. Ripoll-Perelló

RESEARCH on the prehistory of Spain entered a period of intense activity in 1914. Prior to that date, some non-Spanish scholars, especially those from the Institut de Paléontologie Humaine, Paris, had worked in the Cantabrian region on the excavation of sites (e.g., *Cueva del Castillo*), or on the copying and publication of rock paintings. In addition there was isolated activity by competent amateurs, such as that of the Marquis de Cerralbo at the *Torralba* site.

From 1914 onward, a great number of studies were carried out. These included work on the Manzanares terraces, Madrid, by H. Obermaier and J. Perez de Barradas; explorations of H. Breuil and J. Cabré in several regions of Spain; excavations by Conde de la Vega del Sella in the Cantabrian caves; and the discoveries of Bosch Gimpera in Aragón and Catalonia, and his synthesizing books, which added great brilliance to Spanish science. Subsequently, important provincial centers of prehistoric research were founded at Santander, Navarra, and Valencia, where the Servicio de Investigación Prehistórica conducted a notable pro-

gram of excavations, especially in the cave of *Parpalló*.

When in 1939 scientific activity was resumed, a young generation of scholars became very active in a number of places in Spain. Particularly active were the Comisaría General de Excavaciones Arqueológicas, Madrid, under the direction of Julio Martínez Santa-Olalla, the Servicio de Investigaciones Arqueológicas de la Diputación Provincial de Barcelona, under the direction of Martín Almagro, and the Servicio de Investigación Prehistórica de la Diputación Provincial de Valencia, staffed by I. Ballester, L. Pericot, D. Fletcher, and E. Pla, and many other regional and local centers began working as well. Further, a large number of amateurs were working intensively. In 1955, the Comisaría General was superseded by the Servicio Nacional de Excavaciones Arqueológicas, with representatives in each university district to control all archaeological activity in the district. This gave new impetus to prehistoric research, which was further strengthened by the improvement of museums, enhanced teaching of prehistory at the universities, and excellent publications. Financial support has come from several foundations, including the Spanish Fundación Juan March, the American Bryant Foundation (aiding Greek and Roman archaeology), and especially the Wenner-Gren Foundation for Anthropological Research (financing Palaeolithic studies).

The history and the current state of our knowledge on Spanish prehistory are set forth in the first chapter of the synthesizing book by Pericot 1958; see also Pericot 1957 and San Valero 1956b. Those who do not read Spanish may refer to Pericot (1952) and Breuil (1956).

The following brief report on recent research on the prehistory of Spain deals with the years 1956 to 1959, and also indicates work now in progress.

*Lower Palaeolithic.*—Archaeological work on Lower Palaeolithic sites in Spain has been scant during the last three years. Although occasional finds have been reported by the press, especially finds in the terraces of the Manzanares River near Madrid, there has been no real progress, and the situation is essentially the same as it was in 1957 (Pericot 1957a). The Fifth International

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# MAP OF SPAIN WITH SITES MENTIONED IN TEXT

Triangles indicate excavations supported by Wenner-Gren Foundation for Anthropological Research, Inc.

1. Lower Palaeolithic sites in Manzanares Valley (Madrid)
2. *Cueva de Carigüela* (Piñar, Granada)
3. *Cueva del Conde* (Tuñón, Asturias)
4. *La Cueva* (Ribadesella, Asturias)
5. *Cova Negra* (Játiva, Valencia)
6. Mousterian site near Reus (Tarragona)
7. *Abric Romani* (Capellades, Barcelona)
8. *Cueva del Toll* (Moyá, Barcelona)
9. *Cueva de Mollet* (Seriñá, Gerona)
10. *Cueva del Cochino* (Vilena, Alicante)
11. *Cueva del Barranc Blanc* (Rotova, Valencia)
12. *Cueva del Parpalló* (Gandía, Valencia)
13. *Cueva de les Mallaetes* (Barig, Valencia)
14. *Cueva de Ambrosio* (Velez Blanco, Almería)
15. *Cueva del Higuero* (Málaga)
16. *Cueva del Cau de les Goges* (Sant Julià de Ramis, Gerona)
17. *Cueva del Castillo* (Puente Viesgo, Santander)
18. *Cueva de la Pasiega* (Puente Viesgo, Santander)
19. *Cueva de las Monedas* (Puente Viesgo, Santander)
20. *Cueva de las Chimeneas* (Puente Viesgo, Santander)
21. *Cueva de la Cullalvera* (Ramales, Santander)
22. *Cueva de Ardales* (Málaga), containing Palaeolithic art
23. *Cueva de los Casares* (Riba de Saclices, Guadalajara)
24. *Cueva de la Hoz* (Santa Maria del Espino, Guadalajara)



25. Shelters with rock paintings (Nerpio, Albacete)
26. *La Sarga* shelters with rock paintings (Alcoy, Alicante) and sites in Gallinera Valley
27. Albarracín shelters with Levantine paintings (Teruel)
28. *Cueva de los Letreros* (Velez Blanco, Almería), containing schematic paintings
29. *Barranco de Calapatá* (Cretas, Teruel), containing rock paintings and Mesolithic industries (center of Bajo Aragón)
30. Mesolithic site of *Cal Coix* (Gerona)
31. Caves of the mountain mass of Montgrí (Gerona)
32. Mallorca and Minorca
33. *El Carambolo* (Sevilla)

Congress of INQUA (Internationale Quartaervereiningung), 1957, saw presentation of some interesting papers relating to the Spanish Quaternary, notably the important contribution of Riba on the geology of the Manzanares Valley, which affords a good stepping stone for future research (Riba 1957). De Terra studied some of the Guadalquivir terraces (1956).

**Middle Palaeolithic.**—Activity on Middle Palaeolithic sites has been much more extensive. Spahni excavated the *Cueva de Carigüela* at Piñar, Granada, and found it to be Late Mousterian with a rich lithic industry, abundant fauna, and even some remains of Neanderthal man (Spahni 1955). The latter remains have been studied by Manuel Garcia Sanchez and Fusté (Fusté 1956).

For northern Spain, in Asturias, Jordá has published on materials from the *Cueva del Conde*, at Tuñón, and on a Mousterian quartzite industry found in *La Cueva*, at Ribadesella (1955a).

The Servicio de Investigación Prehistórica, Valencia,

has conducted excavations in *Cova Negra*, at Játiva, Valencia, and found that the cave contained several early Mousterian levels, a rich fauna—possibly including *Elephas iolensis*, which poses provocative problems—and a Neanderthaloid parietal (Fletcher 1957a; Fusté 1953). Ponsell (1958) has studied a small shelter near Alcoy, Alicante province, which yielded typical Mousterian points.

A Levallois-Mousteroid site, with some classical Mousterian points of French type, not yet published, has been found by Vilaseca in the vicinity of Reus, Tarragona province.

In the province of Barcelona, Ripoll continued excavating the shelter called *Abric Romani*, at Capellades. This site is important both for its flint Mousterian pieces with dentated retouching, and also for its stratigraphy of alternating sands and travertine, which reflects the successive climatic changes during the Würm glaciation (Virgili *et al.* 1957; Ripoll 1958). There are a few Mousterian remains, including a flint industry and im-

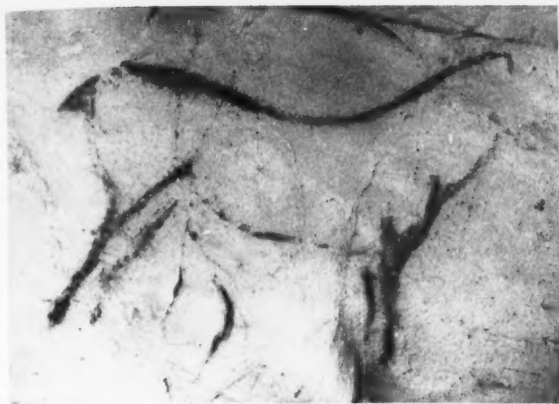


FIG. 1. Horse painted in black (*Cueva de las Monedas*, Puente Viesgo, Santander). Early Magdalenian. Discovered in 1951.

portant fauna, also in the cave of *Toll* at Moyá, Barcelona, and of *Mollet* at Serriñá, Gerona (Thomas *et al.* 1957; Donner and Kurtén 1958).

In some of these Mousterian sites, the upper levels reveal an association with items of Upper Palaeolithic type. Whether these levels may be considered transitional toward the Upper Palaeolithic is a problem for future research. This characteristic occurs, for example, in the almost superficial levels of the *Cueva del Cochino* at Villena, Alicante, which was excavated by Soler (1956). Jordá, on the strength of materials from *Cova Negra*, tends to connect the Spanish Mousterian with the Solutrean (1956a).

*Upper Palaeolithic.*—The problems of the Spanish Upper Palaeolithic are complex, and publication on that prehistoric age has been both frequent and many-sided. Problems relating to the Solutrean have been repeatedly examined (Pericot 1955a), as have the possible relations of the Solutrean in Spain with North Africa (Pericot 1954, 1955b, 1957c). This latter possibility has been strengthened by several recent finds, for example, the human frontal bone from the cave of *Baranc Blanc* at Rótova, Valencia, which corresponds with the type of *Mechta-el-Arbi* (North African Cromagnoid) and of the Guanches of the Canary Islands. Several other aspects of Upper Palaeolithic industry and fauna have been discussed (Almagro 1956; Wernert 1956; Corominas 1956; Jordá 1956d).

There have been excavations in the Cantabrian region, especially by Jordá (1956b, 1957b, 1958), who found a Magdalenian III industry in the *Cueva de la Lloseta*, Asturias; by González-Echegaray (1957a), who found in the Picos de Europa an Upper Palaeolithic industry that, however, is not well defined with respect to glaciation; and by Jansens and González-Echegaray (1958), who found a poor Magdalenian III in the Cave of Juyo, Santander.

Field research and excavations in Valencia have continued (Fletcher 1956). In preparing a second edition of the monograph on the *Parpalló* cave, Gandia, province of Valencia (Pericot 1942), the present authors re-opened the study of that cave during a month's campaign in July, 1959, in hope of being able to establish a climatic sequence, to find some intact zone near the entrance,

and to be certain that there is no industry below the stalagmitic base. Samples were obtained for a climatic study both of the cave of *Parpalló* and of the cave of *Mallaetas*, Barig, province of Valencia. Systematic field research by Pericot, Ripoll, Pascual, and Espí on Monduber Mountain and in the Serpis Valley led to the discovery of several Neolithic sites and to some containing upper Palaeolithic remains (lithic industry). Plans for excavation of these sites are now under preparation.

The *Cueva de Ambrosio*, at Velez Blanco, province of Almería, in the south of Spain, was discovered by F. de Motos in 1911, and its beautiful *pointe-à-cran*—a type of point of Gravettian tradition or workmanship, with a basic lateral notch that produces a kind of lateral peduncle—published by Breuil (1912), has often been reproduced as a prototype. On the advice of Breuil, the present authors started excavating this site toward the end of 1958, and are scheduled to return to it. Two large trenches were opened in the east and west parts of the great shelter at the cave entrance, revealing three levels containing abundant materials. These included blades, graters, burins, Gravette-points, *pointes-à-cran*, and Solutrean laurel-leaf points, all of which are now being studied. We may say that the upper level corresponds to a very poor Mesolithic, and the other two to the Epi-Gravettian and to the Solutrean.

In the vicinity of the town of Málaga, another cave, *Higuerón*, is under study by us. It contains Magdalenian and Solutrean industries.

In the rest of Spain, Vilaseca has conducted research in the *Cova de la Mallada*, province of Tarragona, which has a Gravettian level (Vilaseca and Cantarell 1955–56), and Barandiarán, in the rich Magdalenian cave of Urtiaga, Guipuzcoa (Barandiarán and Elósegui 1955). The present authors, with M. Oliva, are scheduled to complete excavation of the Solutrean *Cau de les Goges* at Sant Julià de Ramis, Gerona. The excavations directed by J. Martínez Santa-Olalla, A. Cheynier, and A. Leroi-Gourhan in the *Cueva del Pendo*, Santander, with a rich Upper Palaeolithic sequence, have been continued, and we await the first reports on them.

*Mesolithic.*—Every year, new surface lithic sites are discovered in the northeast of Spain. All these sites have simple flint industries, reminiscent of Palaeolithic techniques, containing many graters, microburins, and geometric microliths. There are, for example, the sites of *Cal Coix* (Riuró 1953–54) and of San Aniol de Finestres in the province of Gerona; several, with microburins, in the Panadés country, Barcelona province; those now under excavation by J. Tomás in the Calapatá Gorge, Teruel province; and those pointed to by Maluquer (1955) in northern Aragón. A synthesis of the Aragonian Mesolithic has been produced by Ripoll (Almagro, Beltrán, and Ripoll 1956). The same culture in the Bajo Aragón is examined in a doctoral thesis by J. Vallespi, which will be published. The chronology of such sites in Spain will become clear only when we possess good regional surveys like that of Ripoll for Aragón and that of Vilaseca (1956) for Tarragona.

At the Fifth International Congress of INQUA, 1957, geologists suggested a probability that the so-called



FIG. 2. Painted shelters of *La Sarga* (Alcoy, Alicante).

"Asturian" industry was very old, and corresponded to a wet phase previous to the Würm glaciation. There has been much discussion in Spain about this revolutionary theory, but the data on which it is based have yet to be published, and therefore judgment must be reserved (Jordá 1957b). Pericot insists on the Mesolithic chronology of the Asturoid industry found by him many years ago in the Montgrí Mountains, Gerona province. For him this industry is independent of the true Asturian and is a derivation from rough Palaeolithic techniques. In his opinion, the cleavers found by Corominas in the cave of *Mollet*, at Serriñá, Gerona, are of earlier age (Pericot 1956b).

*Art.*—Discoveries of Quaternary art have been few during recent years, but we can cite publications regarding such art in the caves of the mountain *Del Castillo*, at Puente Viesgo, Santander (*Cuevas del Castillo*, *La Pasiega*, *Las Monedas*, *Las Chimeneas*) by González-

Echegaray (1956), and Ripoll (1955, 1956, 1957a). Further, following the spelaeological exploration of the *Cueva de la Cullalvera* in the region of Ramales, Santander, which had already been reported by Alcalde del Río and Breuil, González-Echegaray (1957b) discovered in that cave some horses and signs painted in the Santián style. Ripoll also studied the paintings in the cave of Ardales, Málaga, and of *Los Casares* and *La Hoz*, Guadalajara province, revising the copies made in past years. Although the paintings in the former cave are in a poor state, those in the latter, being engraved, are better preserved, and some new figures were discovered. A new guide to the important *Cueva de la Pileta* has been published (Gimenez-Reyna 1958).

Several recent publications are devoted to trying to rectify the Breuil system on the evolution of Palaeolithic art, as Pericot (1956a) has for a long time advocated. With the archaeological findings, it has become

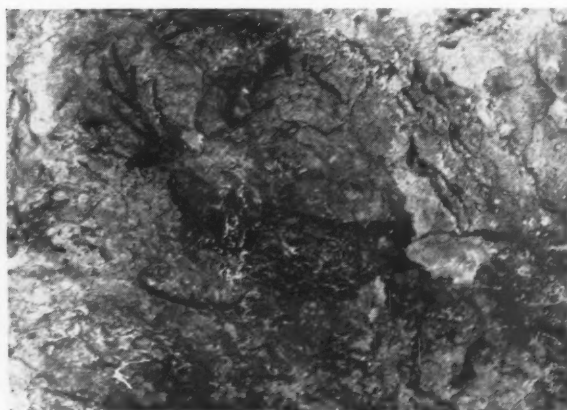


FIG. 3. Deer painted in red (*La Sarga*, Alcoy). East Spanish art (Mesolithic).



FIG. 4. "Naveta dels Tudons" (Ciudadela, Minorca). Bronze Age.





FIG. 5. Cyclopean wall of the talayotic village of Son Carlá (Ciudadela, Minorca). Bronze Age. Door discovered in 1959.



FIG. 6. "Taula" (Torre Trencada, Ciudadela, Minorca). Bronze Age.

evident that the system so patiently and cleverly elaborated by Breuil needs some correction. It seems especially impossible to accept Breuil's theory of a breakdown in the evolution of painting during the Solutrean. On the contrary, we believe that many of the known paintings were made during the Solutrean. As for the art of eastern Spain, it is unanimously felt by Spanish authors that Breuil's theory of a Palaeolithic age for this art is untenable. However, points of view range from the moderate opinion of Pericot, according to whom this art begins at the end of the Magdalenian and develops during the Mesolithic, to the extreme opinion of other authors, who hold that it begins during the Mesolithic and develops into the Neolithic and even into the Bronze age. General works introducing new points of view are those of Kühn (1957), Zotz (1957), Leonardi (1955), and Ripoll (1957-58). Still other works on the subject of the Breuil system are an unpublished doctoral dissertation by Ripoll and articles by Jordá (1955b, 1956c, 1957a; see also Kühn 1956).

There have been some new discoveries of eastern Spanish, or Levantine, art. In Nerpio, Albacete, shelters containing paintings ranging from the naturalistic to the schematic were reported by J. Jiménez Sanchez, García Guinea, Krapovickas, and M. Berge (García Guinea and Krapovickas 1958-59). In the Alcoy region, several painted shelters in *La Sarga* that were discovered some years ago are now under study by Pascual. This is an important ensemble, with superpositions and naturalistic and schematic figures, and also certain great globular signs with compound lines that have never before been observed. In the Albarracín country, Teruel province, Almagro and his collaborators discovered a shelter containing a representation of a ritual dance that is now about to be studied.

Very little that is new can be reported for the field of schematic art, since, unhappily, the magnificent research of Breuil, published in 1934, has yet to be followed up. We may cite only the discoveries by Ortego in the provinces of Teruel and Soria (1955), and the unpublished studies of Ripoll on the schematic paintings around Velez Blanco, Almería, which had already been published by Breuil.

*Neo-Eneolithic.*—Finds from the Neo-Eneolithic age

have continued to be very frequent. New sites, not always well controlled, have been variously characterized as exemplifying the beginning of agriculture and the first metal age in Spain (San Valero 1956a; Bosch 1955; Ripoll 1957b; Castillo 1956; Esteve 1956); the culture of Almería (Giró 1957-58); the Levantine Eneolithic (Pascual 1957; Fletcher 1957b; Thomas *et al.* 1957; Vilaseca 1957-58); Pyrenean and Levant skeletal remains (Fusté 1955, 1957); and the Megalithic culture in general (López-Cuevillas 1955; Almagro and Arribas 1956; Arribas 1955-56). Very valuable are the researches of the Leisners on Megalithic culture (Cerdán, Leisner, and Leisner 1952; Leisner and Leisner 1956), for in their publications we have for the first time a corpus of southern Spanish megaliths with all the plans and material clearly presented. With the new excavations of Extremadura megaliths by Almagro (1959), the in-process studies on Basque megaliths by Barandiarán and Fernández-Medrano (1958) and on Catalan megaliths by Esteva (1956-57, 1958) and Riuró (1958), and the corpus of Pyrenean megaliths in preparation by Pericot and Batista, a complete understanding of the geographical and chronological problems posed by this interesting feature of Spanish prehistory should be attained.

*Bronze and Iron Ages.*—As is true for the Neo-Eneolithic age, occasional finds from the Bronze and Iron ages are frequent, but are many of them lost to science for various reasons.

Beltrán studied this age for Aragón (1955). Sobrino has published on the rock engravings (*insculturas*) from Galicia (1955a, b, 1956a, b), which grow more interesting every day as connections are traced not only to Brittany and Ireland, but even to Morocco and the Canary Islands. Recent publications on Valencian and Andalusian sites refer to materials discovered some years ago (Fletcher and Pla 1956; Alcaer 1956; Pla 1954; Pellicer 1957-58).

Research on the imposing Balearic monuments of Mallorca and Minorca has recently been resumed: the present authors are excavating some of the most important sites, and a conclusion as to a Mediterranean origin for this peculiar culture seems to be indicated.

It is beyond the purpose of this report to enter into

discussion about the Celts and Iberians, much less about the mysterious Tartessian Empire. However, we must note, for the sensation caused by it, the 1958 discovery in the *El Carambolo* hill, on the Guadalquivir terrace in front of Seville, of a golden treasure—a necklace, two bracelets, and eighteen plates—of indigenous workmanship, together with a rich painted pottery of a

type not before known in Spain (Carriazo 1959). The decoration on the pottery is limited to simple geometric patterns, and poses difficult problems in chronology. However, in the nearby town of Carmona, J. de M. Carriazo has found a clear sequence, still to be published. This justifies a hope that at last the rich Andalusia will reveal the secrets of its lineage.

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## RESPONSE TO COLD BY THE ALACALUF INDIANS:

### A First Report on a 1959 Expedition

"The Fuegian wigwam. . . consists of a few broken branches stuck in the ground, and. . . On the west coast. . . covered with seal-skins. . . The climate is certainly wretched; the summer solstice was now passed, yet every day snow fell on the hills, and in the valleys there was rain, accompanied by sleet. The thermometer generally stood about 45°, but in the night fell to 38° or 40°. From the damp and boisterous state of the atmosphere, not cheered by a gleam of sunshine, one fancied the climate even worse than it really was.

"... the men generally possess an otter-skin, . . . which is barely sufficient to cover their backs as low down as their loins. It is laced across the breast by strings, and according as the wind blows, it is shifted from side to side. But . . . [at Wollaston Island we pulled alongside a canoe with six Fuegians who] were quite naked, and even one full-grown woman was absolutely so. It was raining heavily, and the fresh water, together with the spray, trickled down her body. . . another . . . woman, who was suckling a recently-born child, came one day alongside the vessel, and remained there whilst the sleet fell and thawed on her naked bosom, and on the skin of her naked child. . ."

So wrote Charles Darwin in December, 1832 (*Journal of Researches* . . . [London, 1839], pp. 234-35).

On August 25, 1959, nine physiologists and anthropologists departed from Punta Arenas (a port city on the Strait of Magellan) on the schooner "Gloria" for Wellington Island, one of the larger islands in the archipelago of southern Chile where lived about 50 Alacaluf Indians.\*

#### Hammel's Report:

The primary objective of the expedition was to measure the metabolic and thermal responses of these Indians to moderate cold exposure during an eight-hour period at night. Supplemental information was sought concerning the cultural habits of these Indians with respect to their thermal environment. Can they be characterized as the world's most cold-exposed group of people, an inference that may be drawn from the comments of Darwin and many others who saw these primitive people of Tierra del Fuego a century ago?

Nine adult male Alacaluf Indians volunteered (influenced by prized enticements) to rest and sleep on a canvas cot in a single-layer blanket bag with eight skin thermocouples and a rectal thermocouple attached to their bodies and with their heads in a ventilated plastic hood. The ambient air tempera-

ture in an unheated tent in which two Indians slept at a time was ideal for these studies, nearly always between 0° and 5°C. throughout the night.

Oxygen consumption, CO<sub>2</sub> production, skin and rectal temperatures were measured throughout the night. From these data, the metabolic rate, average skin temperature, mean body temperature and the tissue conductance will be derived. Although the analysis of the data is still in progress, several impressions of the results are already apparent. The metabolic rates of most of the Indians were extraordinarily high even at the beginning of the night before hypothermia could have elicited shivering. The metabolic rate increased further in many cases when shivering was stimulated by a moderate hypothermia. As a consequence of the generally elevated metabolism (150% to 200% of the Du Bois BMR for men of the same weight and height), the body temperatures were relatively higher than for White subjects.

Very useful anthropological data were obtained concerning the physical characteristics and the cultural habits of the Alacalufs. Anthropometric data showed that the group studied was of pure Indian stock unmixed with foreign characteristics. Their cultural habits with respect to their thermal environment now and in prehistoric time are such as to preclude repeated long exposure to deep chilling cold, especially at night.

They have always lived in huts constructed of slender saplings formed into parallel arches over which are placed seal skins or other suitable cover material. Each hut is large enough to accommodate one or two family groups composed of a man, one or more adult women, and children. A fire is maintained on the earthen floor in the center of the hut for cooking and heat. The smoke filters out through the loosely joined cover over the midline of the hut. At night the family lies on boughs and skins or other similar padding ma-

terial placed on the ground around the perimeter of the hut and under a blanket of seal skin (or woolen blanket and canvas in these days). Many dogs lie near the fire at night and contribute to the internal heat of the house. Although there may be moderate winds blowing through the channels along which the camp is established (the high winds of the coast along the open ocean rarely blow along the channel side of the island), and although the sky is often overcast and rain and snow are falling frequently, the air temperature throughout the winter months is rarely much below freezing and is commonly between 0° and 10°C. In this environment, a well-constructed hut is sufficient to maintain the native in thermal comfort when inside the hut and under cover at night.

There is more likelihood that body chilling occurs during the day. The search for food and fuel (firewood) is always made in the native's canoe. While rowing, the heat of the exercise may be sufficient to prevent hypothermia. However, not all members of the party, especially the man of the group and the woman who tends the children, will be generating extra heat and may readily become chilled by the moisture-laden winds over the channel water. In addition, the extremities are exposed to the environment. To this day, the women and children have no protection on their feet, legs, hands, and arms. The men usually wear castoff shoes or boots obtained from sailors who navigate the channel route from Punta Arenas to Valparaíso. The clothing worn over the bodies of the adult women and men and the larger children may be similarly obtained. Missioners from the south also provide some clothing for the Indians. In searching for food, the women and children wade the chilly waters (6°-8°C.) of the shore for mussels, clams, sea urchins, etc. In former times they would also dive naked into the water for deeper morsels of food, fish, sea weed, sea urchins, etc. The men were responsible for acquiring larger items of food. They would hunt for seal and otter. Although hunting was a more treacherous occupation, thermal chilling was probably less serious for the men than for the women.

It seems fair to conclude that the Alacalufs have always worn skin cloaks over their bodies, exposing only their extremities and perhaps the pubic area. Under these conditions it seems likely that they experienced frequent acute cold exposure but that they were seldom chronically chilled and certainly were not chilled during the night.

With this pattern of thermal exposure to which to adapt their physiological responses, it is interesting to find them generating an unusual quantity of heat even when no chilling is imposed.

\* Led by H. T. Hammel (Dept. of Physiology, Univ. of Pennsylvania School of Medicine, Philadelphia, Pa., U.S.A.), the expedition consisted of Carleton S. Coon (Museum of Anthropology, Univ. of Pennsylvania), Robert W. Elsner (Dept. of Physiology and Biophysics, Univ. of Washington, Seattle, Wash., U.S.A.), Raymond J. Hock (White Mountain Research Station, Univ. of California, Big Pine, Calif., U.S.A.), K. Lange Andersen (Flynedisinsk Institutt, Blindern, Oslo, Norway), Fred A. Milan (Arctic Aeromedical Laboratory, Ladd Air Force Base, Fairbanks, Alaska, U.S.A.), Alberto Medina (Centro de Estudios Antropológicos, Universidad de Chile, Santiago, Chile), P. F. Scholander (Scripps Institute of Oceanography, Univ. of California, La Jolla, Calif., U.S.A.), and Luis Strozzi (Centro de Estudios Antropológicos, Universidad de Chile). The expedition was supported by a research grant to the University of Pennsylvania from the Air Research and Development Command, Wright Air Development Center and the Arctic Aeromedical Laboratory, United States Air Force. A small grant was received by Carleton Coon from the Wenner-Gren Foundation to support, in part, his studies of physical anthropology.

## Institutions

### ► Associations for the Study of Africa

**Germany.**—The DEUTSCHE AFRIKA-GESELLSCHAFT, founded in 1956, has as its primary aims the encouragement and implementation of practical studies in and on Africa, the giving of advice in connection with German technical aid to African countries, the elaboration of expert opinions for all types of institutions, the setting up of an Information Service for all groups of interested persons, and the editing of publications.

The Society has also planned to register all persons capable of affording technical advice on African matters, to train young technical advisers, to eliminate one-sidedness in exchanges of Africans and Germans, and to co-ordinate all activities concentrated on Africa, whether cultural or human. A central library on Africa is being established, and an annual prize will be awarded for the best article written and published by a German on an African event.

A booklet describing the publications and activities of the Society is available from the Office of the German African Society, Bonn, Rathausgasse 9. Annual subscriptions are DM 20.00; students and apprentices, DM 5.00.

**England.**—The INTERNATIONAL AFRICAN INSTITUTE publishes a quarterly journal, *Africa*, supplied free to members; *African Abstracts*, also published quarterly; and other publications on African linguistics, ethnology, sociology, and history. Annual membership is 35s., FF 1,720, or U.S.A. \$5.25. The publications of the Institute, except the two journals and the Memoranda series, are supplied to Members at a discount of 12½ per cent of the English published price. Inquiries and applications for membership should be addressed to Miss Ailsa Currie, Secretary, St. Dunstan's Chambers, 10-11 Fetter Lane, London, E.C.4.

**U.S.S.R.**—The SOVIET ASSOCIATION OF FRIENDSHIP WITH AFRICAN PEOPLES was founded at a meeting in Moscow in April, 1959. The Association will arrange meetings, social events, talks, and exhibitions devoted to national days of the African peoples, to anniversaries of people outstanding in the cultural field in Africa, and to other important events in the life of African nations. It also plans to ensure the publication of more books by African authors in the Soviet Union, and to send works on the U.S.S.R. to Africa. Information on the Association and on works on Africa published in the Soviet Union is available from Dr. I. Potekhin, Institute of Ethnography, U.S.S.R. Academy of Sciences, Moscow.

**U.S.A.**—The AFRICAN STUDIES ASSOCIATION was founded in New York in 1957. Its purposes are to facilitate communication among interested scholars, to collect and disseminate information, to stimulate and facilitate research, and to hold appropriate meetings. To qualify as a Fellow, a person, irrespective of citizenship, must have demonstrated a continuing scholarly interest in Africa, through teaching or publication. All persons interested in Africa may become Associates, with the right to attend all meetings and to review the publications. Annual dues are U.S.A. \$5.00 for Fellows and Associates. Interested students may become Student Associates at U.S.A. \$3.00 per year.

The Association plans to publish a quarterly, *African Studies Bulletin*, and to establish an inventory of African specialists in the United States. The Secretary is Prof. L. Gray Cowan, Columbia University, 409 W. 117th St., New York 27, N.Y.

► The Modern Language Association and the Ford Foundation are sponsors of the new CENTER FOR APPLIED LINGUISTICS, opened in February, 1959, at 1785 Massachusetts Ave., N.W., Washington, D.C., U.S.A. Its aims include assessing the supply and demand for personnel and materials, exploring the status of research projects on the analysis of languages (particularly in the Middle East and Southeast Asia), and distributing information. Among its activities is the publication of *The Linguistic Reporter*, a clearinghouse of information about applied linguistics and personnel in the field. The *Reporter* is distributed free of charge.

## Serial Publications

► *Abstracts of New World Archaeology* will be published annually beginning in 1960 by the SOCIETY FOR AMERICAN ARCHAEOLOGY, the first volume covering publications appearing in 1959. Journal articles, books, monographs, serial publications, and M.A. and Ph.D. theses will be abstracted, and abstracts by authors will be welcomed. The Editor is Richard B. Woodbury, Department of Anthropology, University of Arizona, Tucson, Ariz., U.S.A.

The *Abstracts* will be distributed without cost to subscribers to *American Antiquity*, and copies will be available to non-subscribers at U.S.A. \$3.50 each, postpaid. Orders, with remittances, should be sent to the Society for American Archaeology, Dr. Betty J. Meggers, Executive Secretary, American Anthropological Association, 1530 P St., N.W., Washington 5, D.C.

► Within little more than a decade, the special field of scientific investigation known as "arid zone research" or "arid lands research" has come into being and grown into a major undertaking of international importance. Because the very essence of arid zone research is the combining of ideas, research techniques, and talent from many branches of science, there is need for new channels of communication among participants, to supplement the publications that are usually seen by only a small circle of specialists.

It is hoped that the newly inaugurated quarterly *Arid Lands Research Newsletter* can make a small but useful addition to such communication among the scientific disciplines. News of any scientific activities relating to arid lands, mainly from Western North America, are earnestly requested and should be sent to the Editor, RICHARD B. WOODBURY, Department of Anthropology, University of Arizona, Tucson, Ariz., U.S.A.

► During 1959 there appeared a new journal called the *Journal of Inter-American Studies*. It is published quarterly by the SCHOOL OF INTER-AMERICAN STUDIES, UNIVERSITY OF FLORIDA. The *Journal* is designed to help satisfy a need for a medium to aid in the exchange of ideas, information, and inspiration among Latin-Americanists. The new journal welcomes scholarly articles representing all phases of Latin-American affairs in all academic disciplines. Annual subscriptions are U.S.A. \$2.00, and all correspondence with the *Journal* should be directed to: *Journal of Inter-American Studies*, Box 3625, University Station, Gainesville, Fla., U.S.A.

► The *International Social Science Journal* is published quarterly in two separate editions—English and French—each issue running to about 200 pages. Its contributors are specialists of renown, from all countries, who are asked to prepare a series of articles on the subject of scientific interest chosen for each issue. In the treatment of these subjects, an attempt is made to bring out the interdisciplinary and international character of social problems and the social aspect of present-day life. Occasionally an issue contains studies involving only one discipline, dealing usually with problems of particularly great international interest.

A separate section of each issue is devoted to the subject round which the contributions are centred. Another section deals with the organization of work in the social science field and provides information on current research, news or accounts of various research

institutes and teaching centres, and abstracts of publications and documents relating to the social sciences issued by international organizations. A summary account is also given of the results of the main conferences or meetings at which social science problems are discussed.

Reflecting as it does the interaction of the various disciplines, the *International Social Science Journal* enables economists, sociologists, anthropologists, psychologists and political scientists to keep informed of the work being done in many fields the repercussions of which upon their own particular branches of study can no longer pass unnoticed. This multi-disciplinary approach is one that can do much to satisfy the growing interest of industry and commerce in the social sciences.

Annual subscription U.S.A. \$6.50, £-/32/6, FF 2,000; each number U.S.A. \$2.00, £-/10/-, FF 600. A specimen copy will be sent upon request. Write to UNESCO PUBLICATION CENTER, 801 Third Avenue, New York 22, N.Y.

► The COUNCIL FOR SCIENCES OF INDONESIA publishes quarterly *Indonesian Abstracts*, providing abstracts in English of current scientific Indonesian literature. (This is a serial, issued irregularly. To appear is the *Indonesian Journal of Science*, biannual.) The first issue of a serial *Bulletin* appears in May, 1959, a "Directory of Scientific Institutions in Indonesia." The *Bulletin* is conceived as an irregular publication, concerned with reports on activities of scientific institutions in Indonesia.

Correspondence on publications should be sent to: Council for Sciences of Indonesia, Medan Merdeka Selatan 11, Djakarta.

► *African Abstracts* consists of full informative summaries of articles on African affairs appearing in current periodicals throughout Europe, Africa, and America. Though concerned primarily with ethnography, social studies, and languages, it also covers material on history, education, the arts, and modern economic and administrative problems in Africa. An international team of abstractors, having special knowledge of different areas of Africa or specific branches of African studies, covers all the most important journals in this field. Offprints of articles not readily available are welcomed so that coverage of all available relevant material may be complete. The articles are abstracted in either English or French. Each annual volume includes an index to subjects, tribes, languages, authors, and periodicals. *African Abstracts* is edited by Professor Daryll Forde and published by the INTERNATIONAL AFRICAN IN-

STITUTE, 10/11, Fetter Lane, Fleet St., London, E.C.4. The annual subscription, payable in advance, is 30s. (U.S.A. \$4.50, or the equivalent in other currencies) post free.

## Prizes

► Any Associate, regardless of nationality or place of residence, may submit an unpublished monograph in the humanities (including archaeology and linguistics), the social sciences (including cultural anthropology), or the physical and biological sciences (including physical anthropology) to the AMERICAN ACADEMY OF ARTS AND SCIENCES in competition for one of three annual \$1,000 prizes. The Academy defines a monograph as a scholarly contribution too long for a journal article and too short or too specialized for a general book. The Academy itself will not undertake publication of award-winning monographs, but its judgment of merit presumably would help to achieve publication through regular channels.

Manuscripts must be in English, typed on one side of the page. Two duplicate copies are requested, but are not required. The deadline for any year is October 1. Write to the Committee on Monograph Prizes, American Academy of Arts and Sciences, 260 Newton Street, Brookline Station, Boston 46, Mass., U.S.A., for particulars.

## Wanted

► Items for museum exhibition of artistic or scientific value from anywhere in the world, by the HAIFA ETHNOLOGICAL MUSEUM AND FOLKLORE ARCHIVES, P.O. Box 533, 19 Arlosoroff Str., Haifa, Israel. Founded in 1956, the Museum is particularly interested in acquiring rapidly disappearing traditional artifacts and folklore of Jewish communities everywhere, and wishes to concentrate particularly on the remnants of vanishing culture traits within Israel.

► . . . the following book: STEPHEN, ALEXANDER M., *Hopi Journal* (ed. E.C. PARSONS) (Columbia University Contributions to Anthropology, 1936). This book is not to be found in any French library and is badly needed at the Department of Social Anthropology, Collège de France in Paris. Should a spare copy be available, either for sale or as an exchange for French publications, kindly notify CLAUDE LÉVI-STRAUSS, Collège de France, 11 Place Marcelin-Berthelot, Paris 5, France.

► . . . contacts for joint work on comparison of historical processes (con-

temporary and long range) in Javanese society with those definable in other societies. I am concerned with the analysis of regional histories to factor out common patterns of change with which to establish empirically based general statements. I feel one major problem in such comparison to be the historical accuracy of the local patterns used; the scope of comparison must be controlled by the limits of accuracy obtainable.—ROBERT R. JAY, Dept. of Anthropology, University of Hawaii, Honolulu 14, Hawaii, U.S.A.

► . . . correspondence with anyone whose research interests correspond with mine. My present studies deal with motivations and influences which have been and still are pushing field work and theories in anthropology on their ways.—GÜNTHER MEHREN, P. O. B. 451, Lörrach/Baden, Germany.

► . . . the opportunity to compare notes with other Associates interested, as I am, in theoretical models for the comparative study of political and administrative systems.—FRED W. RIGGS, Dept. of Government, Indiana University, Bloomington, Ind., U.S.A.

## Congresses

**First World Congress for Jewish Folklore Research**  
September 1-5, 1959  
in Tel-Aviv, Israel

Convened under the auspices of the Israel Folklore and Ethnological Society "Yeda Am" in conjunction with the Tel-Aviv Municipality and Israel Government offices. Co-operating in the Congress was the staff of the Haifa Ethnological Museum.

Chairman of the Congress Board: Yomtov Lewinski.

**Participants** presented seventy-six papers in seven sections. Fifteen papers were received from non-Israeli folklorists in Germany, Poland, Spain, Union of Soviet Socialist Republics-Uzbek, and the United States of America.

### The Congress:

The sections of the Congress were:

- Folkways and Folklife of the Heterogeneous Communities of Israel;
- Jewish Folksongs and Folk Music;
- Folklore in Literature and Linguistics;
- Weddings in Israel;
- Folklore of the Jewish Catastrophe in Europe during World War II;
- Folklore and Folk Narrative Lore; and
- Folk Beliefs and Jewish Sociology.

The Congress marked the dedication of the Ethnological and Folklore Museum Beth Shive Israel ("Israel Tribes Center") at Jaffa, and was a part of the



festivities in honor of the Fiftieth Anniversary of the founding of Tel-Aviv. In addition to the working sessions of the Congress, which were held at the Zionist Organization of America House in Tel-Aviv, various field trips and receptions were prepared for the Congress participants, including visits to the Samaritans' Quarter, the Karaites' Village, and the Habad Settlement.

The purpose of the Congress was to organize and unite students of Jewish folklore in an attempt to collect, assemble, and publish the wide variety of customs and habits of the heterogeneous communities of Jews. The final plenary session of the Congress was devoted to the establishment of a world organization to promote the scholarly pursuit of research in the fields of Jewish folklore. A Central Committee has been established, and it is charged with the preparation of a Second World Congress.

Information supplied by  
LEONARD W. MOSS

## Conferences

### Rural Peoples of the Mediterranean

July 26–August 1, 1959  
at Burg Wartenstein, Austria

Sponsored by The Wenner-Gren Foundation for Anthropological Research, Inc.

Organizing Chairman: Julian Pitt-Rivers, University of Chicago, Chicago, Ill., U.S.A.

**Participants**, and their papers in order of presentation:

JULIO CARO BAROJA, Consejo Superior de Investigaciones Científicas, Madrid. "La Ciudad y el Campo o una Discusión sobre Viejos Lugares Comunes."

MARCEL MAGET, Conservateur du Musée des Arts et Traditions Populaires, Paris. "Notes sur les Formes de l'Habitat Rural en Méditerranée."

E. L. PETERS, Victoria University of Manchester, England. "Some Forms of Genealogy in Relation to Land-Holding in a Lebanese Village."

I. CHIVA, Musée des Arts et Traditions Populaires, Paris. "Droit Coutumier et Économie Agricole."

ARIANE CHIVA-DELUZ, École Pratique des Hautes Études, Paris. "Quelques Aspects du Statut de la Femme Corse."

TULLIO TENTORI, Conservatore, Museo Nazionale delle Arti e delle Tradizioni Popolari, Rome. "Marriage Prognostication among Italian Peasantry."

J. G. PERISTANY, Institute of Social Anthropology, Oxford, England. "Honour and the Family."

J. A. PITT-RIVERS. "Honour, Patronage, and Social Class."

PAUL STIRLING, London School of Economics and Political Science. "The Domestic Cycle and the Distribution of Power in Turkish Villages."

ERNESTINE FRIEDL, Queens College, Flushing, New York, U.S.A. "Some Aspects of Inheritance and the Dowry in Boeotia."

HARRY L. LEVY, Hunter College, New York, U.S.A. "Inheritance and Dowry in Classical Athens."

LAURENCE WYLIE, Harvard University, Cambridge, Mass., U.S.A. "The Upbringing of Children in Provence and in Anjou."

ERNEST GELLNER, London School of Economics and Political Science. "Religion and Politics in Central High Atlas."

P. BOURDIEU, Faculté de Lettres d'Alger. "L'Attitude du Fellah Algérien à l'égard de la Temporalité et les Structures de son Comportement Économique."

A. H. ABOU ZEID, The Libyan University, Benghazi, Libya. "Migrant Labour and Social Structure in Kharga Oasis."

J. K. CAMPBELL, St. Anthony's College, Oxford, England. "Relations of Patronage."

H. R. H. PRINCE PETER of Greece, The Hellenic Anthropological Society, Athens. "The Government of Local Communities in Greece; their Relations with the State; Recent Changes in the Relationship."

### Discussion:

Through the varied topics and contrasting cultures certain themes emerged with regularity: (1) The importance of land tenure and the law of succession in maintaining the basic values of the community, often to its economic detriment. (2) The relation between local community and the national society seen as a function of an evolution in time which modified their physical communications and economic interdependence, and through these the social and cultural distance which separated them. (3) The importance of certain moral conceptions in providing a charter for their interrelation through forms of patronage based upon status or prestige.

There was little attempt at systematic survey of the area, for such an attempt was declared premature. But in most matters there appeared to be a variety of Mediterranean types rather than a Mediterranean type. The greatest homogeneity for the whole area appeared to be found in the conceptions of the self and in the values relating to the sexes, rather than in more material matters.

### Results:

A variety of theoretical points of view were put forward and discussed, as were the criteria to be used in future research. In view of the vast number of publications marginal to the direct interests of social anthropologists, yet containing valuable material, it was agreed that the most pressing need was to establish a centralized service of selective bibliography.

### Workshop in Economic Anthropology

September 5–11, 1959  
at the Shoreland Hotel, Chicago, Ill., U.S.A.

Sponsored by the Research Center in Economic Development and Cultural Change of the University of

Chicago, Chicago, Ill., with a grant from the Committee on Economic Growth of the Social Science Research Council.

Co-ordinator: Andrew Gunder Frank, Michigan State University, East Lansing, Mich., U.S.A.

**Participants**, and their papers:

RICHARD ADAMS, Michigan State University. "Power (Energy) and the Human Group: An Introduction to a Theory."

ANDREW GUNDER FRANK. "Toward Co-operation among Anthropologists and Economists," and "On Economic Organization."

BERT F. HOSELITZ, University of Chicago. "On Measurement Problems Faced in the Field."

EDWARD LE CLAIR, JR., Rensselaer Polytechnic Institute, Troy, New York, U.S.A. "A Minimal Frame of Reference for Economic Anthropology."

HARVEY LEIBENSTEIN, University of California, Berkeley, Calif., U.S.A. "Notes on Economic Models and Non-Economic Interaction."

ROBERT S. MERRILL, University of Minnesota, Minneapolis, Minn., U.S.A. "A Re-analysis of Tax's *Penny Capitalism* Using National Income Accounting."

SIDNEY MINTZ, Yale University, New Haven, Conn., U.S.A. "Internal Market Systems as Mechanisms of Social Articulation."

MANNING NASH, University of Chicago. "The Small Scale Economy: The Context of Economic Choice."

RICHARD SALISBURY, University of California, Berkeley, Calif., U.S.A. "Economic Change among the Siame Tribes of New Guinea."

STANLEY UDY, Yale University, New Haven, Conn., U.S.A. "Rewards and the Institutionalization of Production."

### Other Participants:

KATHLEEN GOUGH ABERLE, Wayne State University, Detroit, Mich., U.S.A.

RAYMOND FIRTH, London School of Economics and Political Science, London, England.

MORRIS D. MORRIS, University of Washington, Seattle, Wash., U.S.A.

MARTIN ORANS, Monteith College, Wayne State University, Detroit, Mich., U.S.A.

BURTON STEIN, University of Minnesota, Minneapolis, Minn., U.S.A.

SOL TAX, University of Chicago.

### Discussion:

The Workshop was held to explore how the research approaches and techniques of economists, anthropologists, and other social scientists might be better brought to bear on the study of socio-economic organization, in general, and economic development and cultural change, in particular. The main topics for discussion were: Economic Organization; Economic Variables—Their Importance, Identification, and Quantification; The Nature and Use of Analytic Concepts in Economics and Anthropology; Relations of Social and Economic Organization; Relating the Intensive Study of Small Communities to Generalizations, and the Understanding of the Region and Culture at Large; and Plans and Provisions for Future Work.

The meetings opened with a discussion of the nature and extent of differences and similarities between the approaches of economists and anthropologists. It emerged that both economists and anthropologists rely heavily on formal theory of social action, pursuing much of their analysis in terms of the concepts of systems, equilibrium, and functionalism; particularly in the study of economic development where their interests currently overlap, both emphasize more substantive considerations; yet, neither rely heavily on historical dimensions. Economists and anthropologists differ, it seemed, in the selection of the phases of their common concerns which they approach formally-analytically and which they approach substantively.

Changes in orientation apparently wrought among the participants may best be perceived in the context of three topics that held their interest: (1) the definition and conception of "economy" and "market," (2) problems of valuation and measurement, and (3) attempts to relate economic and social organization.

The economists argued that we can and should identify an economic system, and that we should distinguish several "economic tasks" of any society—"the market" being one of several instruments of social organization performing such tasks. Some of the anthropologists had been working with substantive, though not very explicitly defined, conceptions of economic and marketing activities. Discussion centered on some difficulties of pursuing either or both approaches in the study of partially monetized societies.

The discussion of problems of valuation and measurement, again especially in partially monetized societies, was essentially a debate between those who pressed for and/or advanced more explicitly formulated and internally consistent standards of valuation and measurement and those who pointed out the difficulty or impossibility of applying the standards in question to research endeavors with which they were

particularly concerned. A large variety of standards and instruments of valuation and measurement were proposed and discussed.

Attempts to relate economic and social organization seemed each time to begin with requests by participants for substantive information from the others. To the extent that economists shared one conceptual framework and anthropologists another, these requests appeared in the form of each discipline's trying to strengthen its own theory by utilizing research findings of the other to quantify and qualify the independent variables of its own theory. But to a large extent both the economists and the anthropologists differed among themselves in selection of conceptual framework, and hence in the information they sought from others. The discussions did seem to clarify where the various conceptual frameworks did and did not overlap, how the study of dependent variables in one theory might aid in quantifying and qualifying the independent variables of another theory, and how the study of different approaches might permit transforming the independent variables in a particular theory into dependent variables in that theory. What battle lines remained seemed to be less between disciplines than between persons inclined to use formal approaches and those inclined to rely on substantive research.

#### Results:

Throughout the debate on the above three topics, each participant, and particularly the more analytically inclined, tended to intrude his own frame of reference and to solicit aid for use within it. The more conscious all became of this common tendency, the more did some differences in approach recede into the background while others became more sharply defined, and the more did the participants attempt to build common frames of reference and to inquire into mutually advantageous research procedures.

Communications, including requests

for the "Summary of the Discussion" (a 25-page document available in limited quantity) and inquiries regarding possible future activities, may be sent to: Andrew Gunder Frank, Dept. of Economics, Michigan State University, East Lansing, Mich., U.S.A.

## Calendar

### 1960

**April 11-14.** Association for Asian Studies. Annual meeting. Hotel McAlpin, New York, N.Y., U.S.A. Program Chrmn., Dr. Eugene P. Boardman, Dept. of History, Univ. of Wisconsin, Madison 6, Wis., U.S.A.

**July 18-25.** 34th International Congress of Americanists. Vienna, Austria. Information: Prof. Robert Heine-Geldern, Institut für Völkerkunde, Reitschulgasse 2, Vienna I, Austria.

**July 30-August 6.** 6th International Congress of Anthropological and Ethnological Sciences. Paris, France. Chrmn., Prof. H. V. Vallois, Director, Musée de l'Homme, Palais de Chaillot, Paris 16<sup>e</sup>, France.

**July 31-August 5.** International Conference on General Semantics. Honolulu, Hawaii, U.S.A. Gen. Chrmn., Dr. Shunzo Sakamaki, Prof. of History, Univ. of Hawaii, Honolulu, Hawaii, U.S.A.

**August 10-17.** International Congress of Orientalists. Moscow, U.S.S.R.

**September 4-October 1.** Regional seminar on "The Museum as a Cultural Center in the Development of the Community." Tokyo, Japan.

**November 17-20.** American Anthropological Association. 59th Annual. Minneapolis, Minnesota, U.S.A. Program Chrmn., Dr. Robert Spencer, Dept. of Anthropology, Univ. of Minnesota, Minneapolis, Minn., U.S.A.

### 1961

**Late August-September.** 10th Pacific Science Congress. Honolulu, Hawaii, U.S.A. Information: Robert W. Hiatt, Univ. of Hawaii, Honolulu, Hawaii, U.S.A.

*Meetings of broad interest will be announced as long in advance as known.*

# LIST OF ASSOCIATES

THIS LIST is published to acquaint all Associates in CURRENT ANTHROPOLOGY with one another, and so that errors and omissions can be called to our attention and rectified.

The information in this list comes almost verbatim from the cards that Associates filled out when accepting our invitation to join in C.A. Some Associates filled out the cards as long ago as January, 1958. Thus some of the information may not be up-to-date. Moreover, many would have responded differently had the purpose of the cards been defined and the questions more carefully worded. For example, there would have emerged a more uniform and precise distinction between "field of specialization" and "areas of interest." However, the editors find the cards so useful in ascertaining the research interests of Associates that we are publishing the information now, despite its unevenness, as a reference tool. We shall later publish a formal Directory of Associates, after all have had the opportunity to supply data more systematically.

The information in each entry below is presented in the following order:

NAME. Address, position and institution.  
Field of specialization. Areas of interest.  
topical. Areas of interest geographic.

The classification letter at the end of each entry, in boldface, serves as a key for quickly locating the geographic areas in which Associates work. This code should someday be extended to include also topical interests. But first we must agree on the topical terms to be used.

**A** Asia  
**E** Europe  
**F** Africa  
**M** Middle East including North Africa  
**N** North America (south through Mexico)  
**O** Oceania  
**S** South America (north through Guatemala and including Caribbean)  
**W** Worldwide

## ABBREVIATIONS \*

aborig. aboriginal, aborigine  
ac. associate, association  
acad. academy, academia, académie  
accult. acculturation  
A.C.T. Australian Capital Territory  
adm. administration, administrative  
Afr. Africa, African, Afrique  
agr. agriculture, agricultural  
A.J.P.A. American Journal of Physical Anthropology  
akad. akademie  
Amer. America, American  
anat. anatomy, anatomical, anatomico  
anth. anthropology, anthropological, anthropologist  
antiq. antiquities  
antiquar. antiquarian  
antr. antropologia, antropologica, ausserordentlich  
a.o.

apt. apartment  
aptdo. apartado  
arch. archaeology, archaeological, archaeologist  
architec. architecture  
arqueol. arqueología  
as. assistant, assistante  
Aust. Australia, Australian  
ave. avenue, avenida  
B.C. British Colombia  
bibl. bibliography  
biol. biology, biological  
blvd. boulevard  
br. branch  
bur. bureau  
B.W.I. British West Indies  
Carib. Caribbean  
cen. century  
ch. champs  
chem. chemical, chemistry  
chrmn. chairman  
chron. chronology  
civ. civilization  
col. college  
colon. colonial  
comm. community  
comp. comparative, comparison  
contemp. contemporary  
coun. country  
C.P. Cape Province. Caixa Postal  
cul. culture, cultural  
cur. curator  
dendrochr. dendrochronology  
dept. department, département  
dev. development, developed  
dir. director  
dist. district

div. division  
dr. doctor  
e., E. east, eastern  
ecol. ecology, ecological  
econ. economic, economy, economics, economist  
ed. editor  
educ. education, educational  
encult. enculturation  
epidemiol. epidemiology  
esp. especially  
est. estado  
ethnogr. ethnography, ethnographical  
ethnol. ethnology, ethnological, ethnologie  
etnogr. etnografiske, etnografiska  
etnol. etnologie, etnología  
Eur. Europe, European  
evol. evolution  
fac. faculty, facultade, faculté, facoltà, facultad  
fed. federation  
fell. fellow, fellowship  
found. foundation  
Fr. French, Français  
gen. general  
geog. geography, geographical, geographisch  
geol. geology, geological, geologica, geologico  
glaciol. glaciology  
gov. government  
grad. graduate, graduated  
hist. history, historical  
hosp. hospital  
H.R.H. His Royal Highness  
i. island  
incl. including  
industrializ. industrialization  
inst. institute, institution, institut, etc.  
instr. instructor  
int. interest  
intercult. intercultural  
intn'l. international  
is. islands  
ist. istituto  
jour. journal  
Jr. Junior  
lab. laboratory  
lang. language  
lect. lecture, lecturer  
lett. letter, lettre, letters, lettres  
L.I. Long Island  
libr. library  
ling. linguistics  
lit. literature  
Man. Manitoba  
math. mathematics  
med. medicine, medical, medicina  
Medit. Mediterranean  
mem. member  
Mesol. Mesolithic  
met. metropolitan

\* Also abbreviated are the names of the states of the U.S.A.



methodol.	methodology, methodological	sch.	school
mid.	middle	sci.	science, scientific, scientifique, scienze, etc.
missnry.	missionary	sec.	secretary, secrétaire
morphol.	morphology, morphological	sem.	seminar, seminary, seminario
mt., mts.	mountain, mountains	serv.	service, servicio
mus.	museum, museo, musée, etc.	soc.	society, social
muscol.	museology, museologist	socializ.	socialization
musicol.	musicology, musicologist	sociol.	sociology, sociologist, sociological
mythol.	mythology	sq.	square
n., N.	north, northern	sr.	senior
nac.	nacional	st.	street
nat.	natural	St.	Saint
natl.	national	str.	strasse, straat
neol.	neolithic	stratig.	stratigraphy
N.S.W.	New South Wales	struct.	structure, structural
N.Ö.	Neider Österreich	supt.	superintendent, superintendenza
no.	number	S.O.A.S.	School of Oriental and African Studies
Ont.	Ontario	technol.	technology, technologi-
org.	organization		cal
Pac.	Pacific	terr.	territory, territoire
paleoanth.	paleoanthropology	transpac.	transpacific
paleoclimatol.	paleoclimatology	treas.	treasurer
Paleol.	Paleolithic	U.	university, universidad, université, etc.
paleon.	paleontology, paleontologia	U.A.R.	United Arab Republic
paleopedol.	paleopedology	U.K.	United Kingdom
path.	pathology	U.N.	United Nations
pers.	personality	UNESCO	United Nations Educational, Scientific and Cultural Organization
philol.	philology		
philos.	philosophy, philosophical	urbaniz.	urbanization
phonol.	phonology	U.S.A.	United States of America
phys.	physical	U.S.S.R.	Union of Soviet Socialist Republics
physiol.	physiology	V.A.	Veterans Administration
pl.	place	v. pres.	vice president
Pleist.	Pleistocene	Ver.	Veracruz
P.O.	Post Office	w., W.	west, western
P.O.B.	Post Office Box	wiss.	wissenschaftlich
pol.	political, politics, politisch, politik	zoo.	zoological, zoology
pop.	population	&	and, und, et
prehist.	prehistory, prehistoric		
préhist.	préhistoire		
prim.	primitive, primitiva		
pres.	president		
prob.	problem, problems		
prof.	professor		
prog.	program		
proj.	project		
prov.	provinces, etc.		
psychiat.	psychiatry, psychiatrist		
psychol.	psychology, psychologist		
Que.	Quebec		
r.	rue, rua		
R.A.I.	Royal Anthropological Institute		
rd.	road		
ref.	reference		
relat.	relation		
relig.	religion		
res.	research		
rscr.	researcher		
s., S.	south, southern		

Lect. Soc. Anth., U. Alexandria. Soc. anth. Nomadic & semi-nomadic peoples esp. econ., pol., kinship systems, Bedouin customary law. Medit. comms., Egyptian, Syrian, Libyan deserts. E-M
ABRAMS, H. LEON. 2810 First St. N., St. Petersburg 4, Fla., U.S.A. Page Found, Inc. Ethnol., soc. anth., aspects of phys. anth., with emphasis on nutrition as part of cul. & phys. anth. W
ACOSTA, JORGE R. Calle de Cordoba 45, Mexico, D.F., Mexico. Sub-Technical Dir., Inst. Nac. de Antr. e Hist. Field arch., restoration of ancient buildings. Toltec, Aztec, Zapotecan culs. Mesoamer. N
ADAMS, INEZ. Dept. Soc. Sci., Fisk U., Nashville 8, Tenn., U.S.A. Ac. Prof. Anth. Soc. & cul. anth. Cul. change in contemp. world, soc. psychol. aspects of accult., theory. Carib., Afr., S. E. Asia. A-FS
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AGUIRRE BELTRAN, GONZALO. Juarez 23, Xalapa, Ver., Mexico. Rector, U. Veracruzana. Soc. anth. Applied anth., "Indigenismo." Mexico, Guatemala. N
AHMED, ALY F. 8 Mohamed Fadel St., Pyramids Rd., Giza, Cairo, Egypt. As. Prof. Sociol., Cairo U. Rural sociol. rural comm. dev. M
AHMED, MOHSEN. Technical Sec., Natl. Inst. of Criminology, 15 Kaar Elali St., Garden City, Cairo, Egypt. Soc. res. methodol. criminol. res. M
AIYAPPAN, AYINIPALLI. Dept. Anth., Utkal U., New Capital, Bhubaneswar, Orissa, India. Prof. Anth. Soc. anth., prehist. mus. adm. Cul. change, family planning, megalithic monuments, comp. studies of regional culs. of India. Kerala, Madras, Orissa. A
AKIYOSHI, EHARA. Hongo 1-1, Bunkyo-ku, Tokyo, Japan. Lect., Juntendo U. Phys. anth. Primate evol., human paleon., human & primate anat. W
ALBERT, ETHEL M. Dept. Speech, U. Cal., Berkeley 4, Cal., U.S.A. Cul. anth. Values, world-view, cul. change, intercul. communication. Cent. & E. Afr., South-west U.S.A. (Navaho, Zuni). F-N

- ALCINA, JOSÉ. Prof., Fac. de Filos. y Letras, U. Sevilla, Seville, Spain. Arch., prim. hist. Prehispanic hist., arch., ethiol., also Neol. of Afr. Amer. (also Afr.). **A-F**
- ALCORÉ, SANTIAGO. Prof. Anth., Lab. de Spair., U. Barcelona, Barcelona, Spain. Phys. anth. Pop. biol. & systematics, growth, paleoanth. Eur., Afr. **E-F**
- ALEGRIA, RICARDO E. Aptdo. 4184, San Juan, Puerto Rico. Dir., Inst. de Cul. Puertorriqueña. Arch., ethno-hist., folklore. W. Indies culs. W. Indies. **S**
- ALEXANDRE, PIERRE H. 59 rue des Mathurins, Paris VIII, France. Lect., Bantu, Ecole des Langues Orientales. Soc. anth., ling. Afr. pol. structs., religs. cul. contacts & soc. change. W. Afr. (incl. Fr. Equat. Afr.). **F**
- ALMÉN, HENRIETTE. Laboratoire de Géol., Cent. Natl. de la Recherche Sci., Bellevue, Seine et Oise, France. Dir. de recherches au Centre. . . . Quaternary prehist. & geol. Quaternary glaciation, relat. of Quaternary geol. & prehist. in France, prehist. & geol. of the Quaternary in the Sahara. France, Sahara. **E-M**
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- ALONSO DEL REAL, CARLOS. Vicedecano, Fac. de F.L. (Hist.), U. de Santiago, Santiago, Spain. Cul. prehist. & protohist. Sociol. & arch. of Mid. Paleol. to Bronze & Iron Ages. Eurasia, N. Afr. **A-M**
- ALPERT, HARRY. Dean, Grad. Sch., U. Ore., Eugene, Ore., U.S.A. Soc. anth. Soc. theory, soc. org., professional aspects of soc. sci. France. **E**
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- ANCAUX DE FAVEAUX, ADALBERT (DOM). Monastère St. Benoît, Kansenia (Katanga), Belgian Congo. Maître de Conférences, U. "Lovanium." Phys. anth., prehist. arch. Early & Mid. Stone Age. Afr. **F**
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- ANDERSON, ROBERT. Ac. Prof., Dept. Anth., U. Utah, Salt Lake City 12, Utah, U.S.A. Ethiol., soc. anth. Ceremonialism, kinship, hist. of anth. U.S. Plains, Basin, esp. Cheyenne, Ute. **N**
- ANDERSSON, EFRAIM. Prästgården, Kårhöle, Sweden. **N**
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- ANELL, BENGT. Malma Stensväg 10, Uppsala, Sweden. Lect., Uppsala U. Ethnogr. (cul. anth.). Hunting & fishing culs., prim. econ., Polynesian & N. Amer. prehist. & mythol. Oceania, N. Amer. **N-O**
- ANFOSSI, EMILY LEALE. Corso Solferino 9-5, Genoa, Italy. Prehist. arch. Caves of W. Liguria, Upper Stone Age to Iron Age. **E**
- ANGEL, J. LAWRENCE. 165 W. Durham St., Philadelphia 19, Pa., U.S.A. Ac. Prof. Anat. & Phys. Anth., Daniel Baugh Inst. Anat., Jefferson Med. Col. Phys. anth. Human genetics, fossil man, soc. biol., structure & function, chronic disease, prehist. esp. of Eur. Greece, Cyprus, modern U.S.A. **E-N**
- ANGELI, WILHELM. Naturhistorisches Mus., Prähistorische Abteilung, Burgung 2, Vienna I, Austria. Prehist. Hist. of sci., the Neol. Mid. Eur. **E**
- ANGELINO, HENRY. Ac. Prof. Educ., Dept. of Educ., U. Okla., Norman, Okla., U.S.A. Cul. anth. Cul. & pers., infant & child training, adolescent dev. Pac., Afr. **F-O**
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- APTER, DAVID. 2319 Brown Ave., Evanston, Ill., U.S.A. Ac. Prof. Pol. Sci., U. Chicago, Chicago 37, Ill., U.S.A. Pol. sci. Econ. growth & pol. dev. Afr. **F**
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- ARANA, EVANGELINA. G. Najeta #24-A-7, Mexico 8, D.F., Mexico. Investigador, Inst. Nac. de Antr. e Hist. Ling. Ethiol. Mexico. **N**
- ARENS, RICHARD (REV.). Prof., U. San Carlos, Cebu City, Cebu, Philippines. Cul. anth. Philippines, comm. studies. S.E. Asia, China. **A-O**
- ARISS, ROBERT. Cur. Anth., Los Angeles County Mus., Exposition Park, Los Angeles 7, Cal., U.S.A. Soc. anth., cul. hist., ethiol., ethnohist., applied anth. esp. to popular educ. Soc. org., cul. contact & change, cross-cul. analysis of Anglo-Amer. cul. & ethos. Worldwide and specific, esp. Hispanic cul. contact in the Amers. **W**
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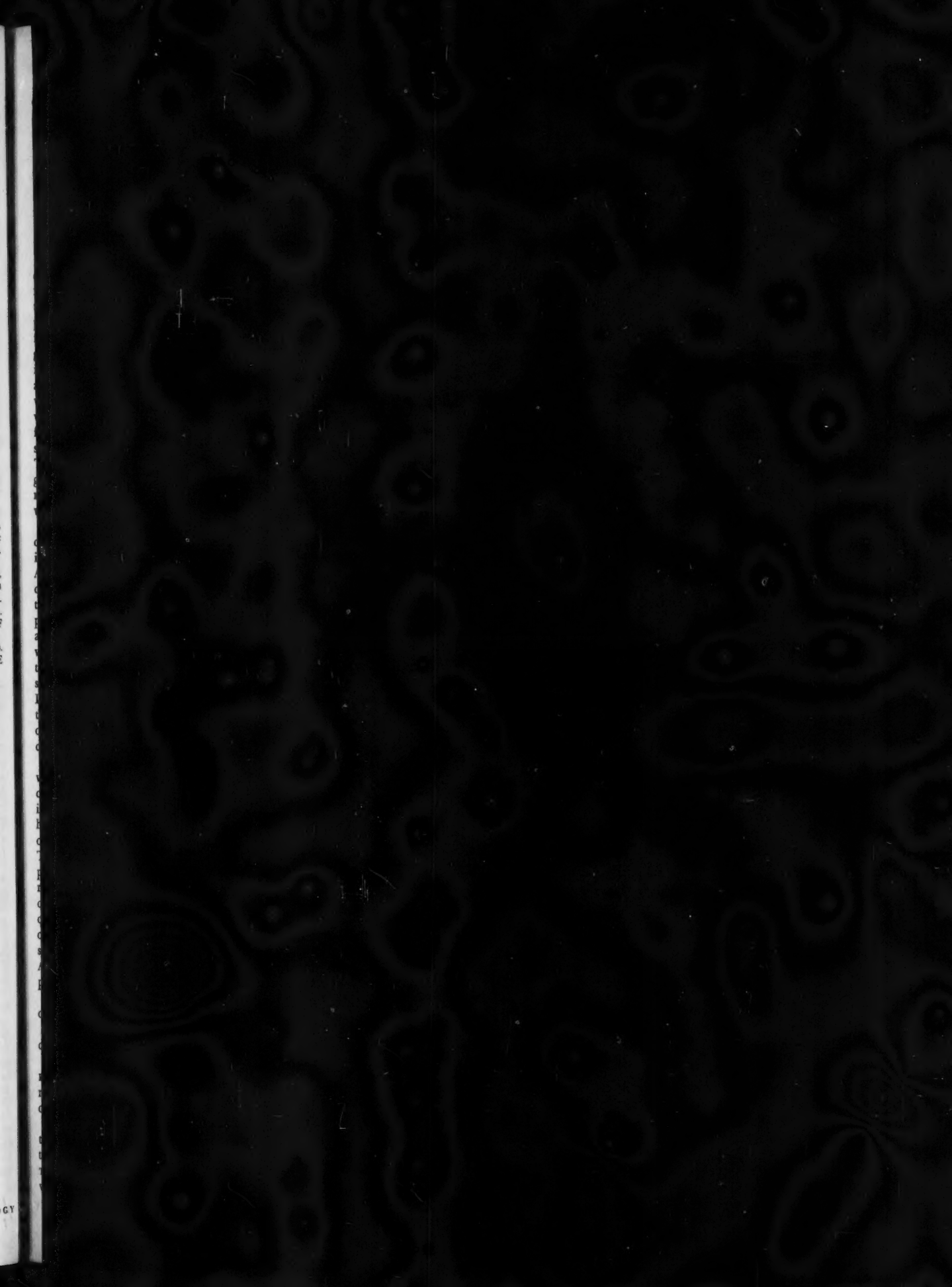
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- Z**
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- border line ling., Cent. Afr. ethiol. Cent. & S. Afr. **F**
- VAN DER HAMMEN, THOMAS. Apt. Nac. 25-99, Bogota, Colombia. Chief, Palynological Section, Servicio Geol. Nac.; Prof., Inst. de Antr., U. Nac. Palynology, Pleist. geol., archaeol. Paleoclimatol., Holocene. n. w. S. Amer., Eur. **E**

## Supplementary list through Dec. 31, 1959

- AGACHE, ROGER. 11 rue des Rapporteurs, Abbeville (Somme) France. Correspondent de la Comm. Supérieur des Monuments historiques. Prehist. arch. Paleol. & Neol. of the Somme Valley. **E**
- AKUFFO, BENNETT SMITH. P.O.B. 127, NSAWAM, Ghana. Private Rsc. Anth. Drumming, dance, Akan folklore, traditions & customs. Ghana, Afr. **F**
- BUHOCIU, OCTAVIAN. 15, rue Brown-Séguard, Paris, 15e, France. Sec. Gen. du Centre Roumain de Recherches de Paris. Mythol., folklore. Philos. of Hist. E. Eur., esp. Carpato-Ponto-Danubienne region. **E**
- D'ALOJA, ADA. Insurgentes 404, Dpto. 7, Mexico 7, D. F. Escuela Natl. de Antr. e Hist. **N**
- DEL HOYO CABRERA, EUGENIO. Inst. Tecnológico y de Estudios Superiores de Monterrey, Monterrey, N. L., Mexico. Custodian of the Library. Ethnogr. Early & colonial hist. of n.e. Mexico. N.e. Mexico & s. e. U.S.A. **N**
- HENDERSON, GERALD M. Dept. of Sociol. & Anth., Brooklyn Coll., Brooklyn 10, N. Y. Instr. in Anth. Phys. anth., Amer. arch., hist. of bio-anth. theory. Pers. & cul. Arctic, N. Amer. Indian. **N**
- JACQUES-MEUNIE, DJINN. 5, rue Frédéric Bastiat, Paris, 8e, France. Attaché de Recherches au Centre Nat. de la Recherche Scientifique. Ethnol., sociol., arch., protohist., custom, dialectology. Arab & Berber civs. of presaharian Morocco & of Mauritania. **F**
- KAELIM, JOSEF. Zoologisches Institut, U. of Fribourg, Fribourg, Switzerland. Dir. Phys. anth., comp. anat. Fossil hominids & primates; method. problems of rsc. in evol. **W**
- LEE, SANG BECK. Dept. of Sociol., Coll. of Liberal Arts & Sciences, Seoul Nat. U., Seoul, Korea. Prof. Sociol., cul. anth. **W**
- MCCARTHY, FREDERICK DAVID. Aust. Mus., Sydney, N. S. W., Aust., Cur. of Anth. Ethnog. & arch. of Aust. & Melanesia. Art, diffusion, & cul. relats. **O**
- MARQUEZ YAÑEZ, FRANCISCO. Calle 54-A No. 16-51, Bogotá, Colombia. Sec. del Inst. Colombiano de Antr., Aptdo. Natl. 407. Soc. scis., folklore, juridic scis., bibliog. **S**
- MASSÉ, LOUIS. IFAN B.O.P. 206, Dakar, Mali, Fr. W. Afr. As., IFAN. Soc. aspects of public health & demog. W. Afr. **F**
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- VAN HECKEREN, HENDRIK ROBERT. Rijksmuseum voor Volkenkunde, Leiden, Netherlands. Prehist. arch. Indonesia & Far East. **A**
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- VERSINO, ETTORRE. Viale de Trastevere No. 115, Rome, Italy. Arch. Etruria. **E**





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- PLATO. 1914. *The dialogues of Plato*. Transl. into English by B. JOWETT. With general introduction by TEMPLE SCOTT. New York: Hearst's International Library Co.
- ERASMUS, CHARLES JOHN. 1952. The leader vs. tradition: A case study. *American Anthropologist* 54:168-78.
- BOYD, M. F. 1949. "Historical review," in *Malaria: A comprehensive survey of all aspects of this group of diseases from a global standpoint* (ed. M. F. BOYD), Vol. 1, pp. 3-25. Philadelphia: W. B. Saunders.
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